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AUTHENTIC SCIENCE

FICTION MONTHLY



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MORTIMER

ARTICLES: FOOD IN SPACE; MAKE-BELIEVE SPACE SHIPS
STORIES: by E. C. TUBB, DAN MORGAN, JOHN HYNAM, etc.

AUTHENTIC SCIENCE FICTION MONTHLY

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Editorial

I RECEIVED A LETTER THE other day and, because it touches on something of interest to us all, I'd like to talk about it here instead of squeezing other letters out of the readers' column. The writer, a young man, wanted to know how to set about writing a good science fiction story.

A simple request? Well, suppose we think about it for a little while. Writing a story, any sort of a story, isn't as easy as most people seem to think. Many young writers, filled with the urge to do better than the professionals, have learned that, like everything else worth doing, writing takes time, patience, knowledge and experience. Above all, experience; the percentage of new writers who have sold their very first story—and then sold their second—is remarkably low.

It isn't enough just to put down words; those words have

to mean something. It isn't enough to have what you may think is a good idea. That idea has to be presented in an entertaining form, for that is what a story is, you know, entertainment. No matter how cunning the concept, how strong the moral, unless it is entertaining to the reader, then it will not be read and the concept or moral lost through lack of communication.

And science fiction, to someone outside the medium, is probably the hardest type of story to write at all.

It doesn't seem that way, I agree. With the entire universe at our disposal, with all of space and time, and the realm of science, to use as our background, with every imaginable concept, both possible and desirable, then why should science fiction be so hard to write?

The trouble, I think, must be that it seems too easy. Writers tend to forget that,

while they send their space-ships to the stars, they are still dealing with accepted facts and human motivations. We cannot breathe on the Moon, so a story based on Luna must accept that fact. The Solar System is known, so space stories which introduce extra planets are not science fiction—not unless they introduce them in a logical way. And the writers neglect of logical thinking is probably the greatest fault they can make.

It doesn't matter how you build your framework, what type of society you construct or situation you develop, your characters must operate logically within the framework you give them. And make your characters real people, not press-button robots or cardboard silhouettes. Give them depth, give them emotions, make them real. A good story always deals with human beings—they are of prime importance, but that does not mean that the science, the action, the entire framework against and in which they move must not be as equally real.

To get back to the apparently simple request—how to set about writing a good

science fiction story. The answer is to read all the science fiction you can, learn your subject, soak yourself in it and then, when you are ready, write your story. Write it as best as you can, put it away for a month or two, then take it out and read it. Still like it? Then submit it to a professional magazine.

Only—when you read it look at it as though you were reading the work of a stranger. Look for faults, be hard to please and, if necessary, rewrite the whole thing. Only when you are honestly convinced that you have written the best story you can, should you submit it.

And don't be bitterly hurt and disappointed if it should come back.

Never forget that you, as a reader of a magazine; have a right to the very best material possible to obtain. As an author you must climb the very hurdle set by you as a reader. You must always try to produce a better story than the ones you have just read. Only by doing that will you be helping to raise the quality of the magazine even higher.

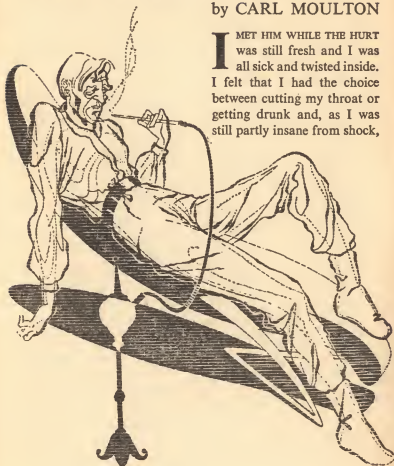
So—what are you waiting for?

It isn't always nice to be——

The Man in Between

by CARL MOULTON

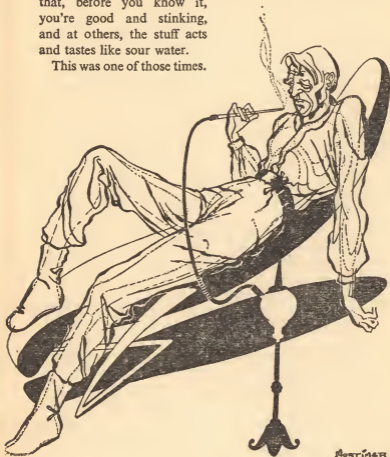
I MET HIM WHILE THE HURT was still fresh and I was all sick and twisted inside. I felt that I had the choice between cutting my throat or getting drunk and, as I was still partly insane from shock,



I tried to get drunk. Tried to. It's a funny thing about alcohol; sometimes it meets you more than half-way so that, before you know it, you're good and stinking, and at others, the stuff acts and tastes like sour water.

This was one of those times.

Carmodine had taken most of my money and sold me a litre of rock juice with permission to sit at the bar and



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drink it. Rock juice is made from anything which happens to be available at the time and, if you're very lucky, you might even get some surgical spirit in it. Personally, I wouldn't have been surprised to learn that I was drinking cut-down rocket fuel. It didn't matter.

I was half-way through the bottle when the stranger reached over and touched me on the arm.

"Alcohol," he said mildly, "is a depressant. All it does is to accentuate your present emotion."

"So what?" I tipped the bottle and did more damage to my vocal chords. "Join me?"

"No." He looked at me. "You're Jim Blake. I'm Harry Fendyke. I've heard all about you."

"All about me?" I stared at him and he stared back.

He was that rare thing in the Belt—an old man who really was old. There are plenty of the other kind, young men who look old, but you

don't often see the genuine article. Like me, he was dressed in heavy coveralls, the pockets zippered and the material worn and faded with dirt and time. He wore magna-boots and a radiocap, but had left off his contact belt. At first glance he looked exactly like any of a thousand prospectors to be found within half an astronomical unit of where we were sitting.

"You made a strike," he said. "You thought you'd struck it rich, then you found you hadn't. Now you're feeling sorry for yourself and want to run away." He touched the bottle. "If you feel like that about it, why don't you get yourself a couple of pipes?"

"Opium costs more than liquor," I said. "Anyway, I don't go for that stuff."

"Why not? Alcohol, opium, neococaine, reefers, tingle-tubes, what's the difference? They all offer the same thing."

"I don't think so." I tasted the rock juice again, then pushed away the bottle. Some-

how, I had lost the taste and desire for the stuff. I glared at the old man. "Listen, I didn't ask you to talk to me, and I can do without your preaching. And you're wrong about one thing. I was gypped out of that claim. Robbed blind."

"That's what you say."

"I'm no liar," I snapped. "I found it, marked it, and came in with the samples for assay. They read high and I knew that I'd hit the jackpot. So what happens? By the time I get my ship cleared and find the place again I've been jumped. A different marker, and a resident prospector with a couple of goons to stop arguments. I came back and found that my claim application had been altered in one of the co-ordinates. I argued and they threw me out. Robbed? You tell me?"

"You could have made a mistake," he suggested. "Those orbits are pretty erratic, and it wouldn't be hard to plot a wrong set of co-ordinates."

"Maybe." I gulped down some of the swill I'd bought and paid for. "But I've been in the Belt for five years now and I know my business. The claim office is working strictly for Consolidated, and a lone prospector doesn't stand a chance." He didn't say anything and his silence annoyed me.

"You think I'm talking hot air? Listen. How many lone prospectors have hit it rich during the past two years? How many big claims have been registered by Consolidated? You trust the claims office? Then how is it that the recorder lives like a king on an income which wouldn't keep him in cigarettes? Get wise, Harry. The Belt's rotten with graft."

A juke box tore the air with a blare of noise just as he opened his mouth to say something and everyone turned to stare towards the stage. Carmodine's imported stripper, a fifty-year artificial blonde, danced forward, blew a few kisses, threw off a few

veils, and went into her routine. I turned away in disgust to find Harry staring at me. He raised his eyebrows.

"I had a mother," I explained. "You were saying?"

"If you think the Belt's so bad then why do you stay?"

"Why do you?"

He nodded, as if I'd answered his question, and looked around at the crowd. They were so intent on the floor-show that he could have committed murder and no one would have noticed. Even then he wasn't satisfied. He jerked his head at me and slipped from his stool.

"I'm going. I'd like you to come with me."

"Why?"

"To talk." He smiled. "To find out why, if you think the Belt's so bad, you haven't done anything about it."

He moved off then, thrusting his way through the crowd and, after a couple of seconds, I followed him.

He led me to Ku Fei's.

Ku Fei was a Eurasian

who had grown rich selling dreams. His pipe palace was known all over the seventh decant and he imported his stuff direct from Earth. Good stuff, too, top-grade opium from the poppy fields of China and, in a way, he was a craftsman at his trade.

I stopped outside the door and stared at Harry.

"What's the idea?"

"I want to talk to you. If you know a more private place let me know. If you don't, follow me and keep quiet."

He had a point there. Privacy, in the cramped quarters beneath the dome, was at a premium. The walls were thin, the place was crowded, and no one knew when a whisper might be picked up and amplified by a trick of acoustics. I was remembering all that as I followed Harry into the pipe palace.

A doorman, a Jap or a Chinese—I wouldn't know the difference—bowed and hissed at us as we entered. That was the only homage he paid to

tradition. When he spoke it was in English, better than mine.

"Pipes?"

"Two. Put us in adjoining bunks." Harry paid out a sheaf of creased bills and nudged me as the doorman handed us over to an attendant.

"You smoked before?"

"No."

"Don't inhale. Just relax and pretend that you're enjoying it."

I nodded and sat on the edge of a low bunk while the attendant prepared the pipes. All around, in a long low room filled with bunks, men sat or reclined, smoking and staring before them with glazed eyes. Others had sunk into a drug-induced stupor, and one or two muttered in their sleep. The air was heavy, sickly, filled with a vaguely disturbing fragrance, and I was reminded of the community barracks where I had stayed while working on Mars.

I wasn't disgusted, or em-

barrassed, or guilty. Ke Fei ran a legitimate business, for in the Belt, drugs, like alcohol, were legal. In fact, anything was legal if you could get away with it. The only law enforcement station in the entire decant consisted of not more than a dozen men, and they couldn't be bothered with any crime short of murder.

That was in practice. In theory, they were supposed to uphold the entire legislature. They did, too, but to get justice you had to collect the evidence, grab the criminal, find your witnesses and take the entire shooting match to the station for a hearing and sentence. Naturally, as that was a lot of bother, law in the Belt tended to be settled without the sanction of the authorities.

The attendant passed me the pipe, a slender-stemmed thing of plastic with a tiny bowl, and I settled back on the mattress and pretended to be enjoying it. Beside me, his mouth a few inches from my

ear, Harry grunted and smoked until the attendant had soft-shoed away.

"I could be wrong," he said quietly, not whispering, but speaking as if to himself. "Maybe you haven't got what I'm looking for, but I'm willing to take a chance. How badly do you hate Consolidated?"

"I can't tell you." I answered him in the same way. "They haven't invented the word to describe it."

"I was afraid of that." He sent scented smoke coiling over my head. "You're wasting your energy, Jim. Hating is a negative emotion. It means that you want to destroy, not create. You want to tear down, not build up. It means that you've got a little mind."

"I'm no Christian," I said. "Also, I've been slapped on both cheeks at once. Should I offer them my rear?"

"You've been hurt. But that's past, finished with. Do you want revenge or do you want to do something so that

others can't be hurt in the same way?"

"I'm no Crusader."

"Every man is a Crusader, Jim. He may not know it, but he is. You are. If you weren't then what are you doing out here in the Belt?"

"That's simple. I've the yen to get rich."

"Money? You've spent how long? Five years, isn't it? Five years of living in constant danger, doing without luxuries, doing without most of the things which people accept as their right, and you tell me that you've done it all for money." He chuckled to himself. "How much are you worth, Jim? You've a ship, maybe. Some equipment, probably a load of debt and a mounting fuel bill. You've lived on the edge of bankruptcy ever since you hit the Belt. If you want money why don't you take a job? With your knowledge and resourcefulness you could live rich. Why don't you?"

I didn't answer. The smoke was getting into my brain and

I was having trouble with my eyes. Harry wasn't surprised. He seemed to be quite contented talking to himself.

"You don't because you can't," he said. "Space is in your blood and you can't get it out. I'll bet that you worked on Mars until they beat the desert and made life easy. Then you came out here to the Belt. When the ships reach out towards Jupiter you'll be on them, too. You know what you are, Jim? You're a pioneer."

He sucked at his pipe and kept on talking. I seemed to be sinking in a cloud because his voice seemed awfully far away.

"You don't like things as they are here, but you won't do anything about it. You let yourself be robbed and swindled, and all you can think of is getting drunk. You blame Consolidated, but you never stop to blame yourself. You're weak, Jim. You haven't the guts to stand up for what you represent. You're a coward."

I swung at him then, but my arm had no strength and all I did was to roll over so that I stared into his face. He grinned at me and blew smoke into my eyes.

That was the last thing I remembered.

I awoke and my stomach told me that I was in space. Beneath me I felt the hard surface of a bunk; across chest and thighs webbing held me down, but I wasn't a prisoner. I released the snaps and swung my legs over the edge of the bunk, slapping my magnaboots against the metal of the floor before trying to stand upright. I sat down again as my head almost burst and was still nursing it when Harry came aft from the controls.

"Awake, Jim?" He slipped a coffee bulb in my hand. "Drink this and you'll get rid of the butterflies." He waited until I'd drained the container through its tube. "Better?"

"I'm alive." I looked

around. I was on my own ship. I knew every scratch on the bulkheads. "What's the idea?"

"Don't you remember?" He grinned at me, his seamed old face crinkling around his youthful eyes. "We made a deal, we're partners."

"Don't try it," I said tiredly. "I've been taken by experts. You got me doped in Ku Fei's. Why?"

"I warned you about inhaling."

"I didn't inhale. I didn't have to." I ran my tongue over fur-lined teeth. "Got a cigarette?"

He passed me one and I sucked it into life, letting the smoke bite some of the slime and fuzz from my mouth and throat. I took a second drag and squinted at him through the smoke. "Well?"

"You're a heavy smoker, Jim. You inhale without realising it. I didn't deliberately drug you; you just went on an opium jag."

"Then to hell with opium! I thought that you were sup-

posed to get some fancy dreams with that stuff."

"Not at first, you don't. After you're used to it a couple of pipes will send you to Paradise." He looked at me, rubbing the short bristles on his chin. "You want to take another swing at me?"

"After I've heard what you've got to say." I sucked at the cigarette and relaxed, listening to him talk.

"I was stuck when I met you, Jim. I won't deny that. I was watching for you. I'd heard about what had happened to your claim. I'd a little money and no ship. You had a ship and no money. I thought it would be a good idea for us to become partners." He hesitated. "I didn't realise that you didn't know what you were saying. We made the deal and then you passed out. The Field Supervisor knew you and let me take out your ship."

I didn't believe him. Not about the watching for me and the rest of it, but about us making a deal. I've never

yet been so drunk that I didn't know what I was saying. I stood up and walked forward towards the controls. The fuel gauge registered full. I checked the water. Full. I opened the locker and stared at the ranked cans of rations. Harry, whatever his reasons, had done what I couldn't do. He had restocked my ship and got it into space. I returned to the bunk, pulled my feet off the floor, and gripped the edge just in time to prevent my drifting up to the ceiling.

"Where are we?"

"Three hours out from Central and heading towards Morgan's Cluster."

"That where we're going?"

"No." He sat down beside me and rubbed his chin again. "Well? You still haven't told me."

"We're partners," I said. "For this trip only unless you give me good reasons. I don't like running in double harness."

"Maybe that's your trouble." He hesitated and

gnawed his lower lip. "Look, Jim, at the moment you're sore at Consolidated for jumping your claim. That's right, isn't it?"

I just stared at him.

"Have you ever looked at it from their viewpoint? They don't know you, probably have never even heard of you or your claim. To them you'd just be another prospector making a nuisance of himself with a ridiculous accusation. I'm talking of the company, Jim, not the local agents."

"Same thing."

"No it isn't. A company has no soul, no heart, no jaw to take a swing at. A company is impersonal. Consolidated exists to make money for its shareholders. To do that it has to be efficient, and that means buying rich claims as cheap as possible and selling what they take out of them for all the traffic will bear. That's business."

"So it's business. They rob me blind and it doesn't matter because it's business. What

are you trying to do, Harry? Whitewash them?"

"They don't need whitewashing. Consolidated has poured billions into its investments in the Belt and they want to keep clean. Under Earth law they have to keep clean. If they don't, then they're in trouble." He looked at me. "Your claim was worth say, fifty thousand credits?"

"Call it a hundred."

"All right then, a hundred. Compare that to the billions Consolidated have spent out here, and the profits they hope to make. Do you think it would pay them to gyp you out of a lousy hundred thousand?"

"Perhaps not me," I admitted. "But I'm not the only one. Add us all up and you're not far short of a million or so. That's big money whichever way you look at it."

"Consolidated's turnover runs close to eight hundred millions a year," said Harry quietly. "It still doesn't make sense. In fact, this claim-jumping business is the last

thing they want. It hurts their reputation."

"I'm crying," I said. "I'm really sorry for them."

"You're still bitter," he said. "You're not able to think straight and you won't be until you get some sense. Why don't you sleep on it?"

"What about the ship?" It was all I owned in the universe. If anything happened to it I was right back in the gutter sifting swill for something to eat. Harry pressed me back onto the bunk.

"Relax. I'm an experienced pilot. Nothing will happen to it." He grinned down at me. "Just give your brains a chance and stop feeling sorry for yourself."

I swore at him as he left me.

A second sleep washed the traces of the dope from my system and cleared my mind. I even did some thinking about what Harry had told me, but it didn't do me any good. It certainly didn't give me the hundred thousand I'd lost, but that was past, and, if

I hoped to keep operating, I had to find some pay-rock, and fast.

I'd spectroed a couple of boulders and was swinging the thermite gun around to a third when Harry joined me from the other half of the living quarters. He watched as I shot a thermite charge to the rock, read the spectrographic pattern revealed by the vapourising of a fragment of the surface, then looked into my face to see the result.

"Any good?"

"No." I gestured towards the spectro screen. "Read it for yourself. Nothing but rock, a little iron, a trace of copper and other stuff."

"I'll take your word for it." He didn't look at the screen. "Thought about what I was telling you?"

"Maybe." I swung the gun towards a promising looking mass, then relaxed as the radio emitted a droning pulse pattern. "Too late. Someone has set up their marker." I glowered at it as we swept past. "That's Consolidated's

pattern. They own every damn rock in the vicinity."

"Why not?" Harry handed me a coffee bulb and sucked at the nipple of his own. "Who else would buy them? You can't blame them for laying in a stock of raw material."

I sucked at the coffee and didn't answer. Outside, dim against the stars, the jumble of asteroids which constituted the Belt moved with silent dignity as they had done for countless years. On the control panel the radar blipped as it registered the rocks and little green flecks crawled over its screen.

"It gets you, doesn't it?" Harry stood beside me. "There's adventure out there, and excitement, and the means to build a thriving community out here in the Belt. Fuse the debris after extracting the minerals, set up a few domes, pulverise the rock to make soil and, in a few years, we could have our own settlements in the Belt. That's Consolidated's long-term policy."

"That's generous of them." I didn't trouble to hide my sneer. "Then what? They fix the rents and cost of staples, and get what they've always wanted. A nice little slave state right under their thumb. That's not for me."

"You've still got that chip on your shoulder, haven't you, Jim?" He stared down at his coffee bulb. "Look, get some sense for a change. Have you ever stopped to wonder why the company pays a fair price for your claims? If they were what you think they are they could beat you right down and you couldn't argue. They don't. Do you know why?"

"We wouldn't sell to them, that's why."

"Wrong again. Who else would you sell to? Consolidated's the only company in this decant. How else would you be able to buy food and fuel if they didn't buy?"

"All right, so I'll ask the question. Why do they pay?"

"So that you can go out and find more claims." Harry

grinned at me. "Simple, isn't it? Basic economics. It's cheaper for the company to let independent prospectors find the pay-rock than to employ their own. You work harder, take more risks, provide your own ships and fuel, need no insurance, claim no compensation in case of injury." He shrugged. "Why go on? Boil it down to man-hours against money received and you independents work for peanuts. The company pays you a fair price because they can't afford to let you go out of business. They need you."

"Fine way they've got of showing it."

"Consolidated isn't responsible for what happened to you, Jim. Some smart-Aleck operators have seen the chance to work a racket and they're doing it. The company know it, but what can they do? On the surface everything is legal. Can they refuse to buy? Can they accuse the recorder of theft? And they need the raw materials, Jim. They've

got to have them to stay in business."

"More whitewash, Harry?"

"No, Jim. I'm just trying to show you how gutless you are."

My fist had travelled almost to his mouth when I managed to stop myself. He was an old man, and the old, like fools and children, are entitled to certain liberties. Also, he was my partner, and you don't quarrel with your partner while in space, not if you want to return alive you don't.

"It's easy to blame the company, isn't it, Jim? They're big and bad, and everyone knows it. But what about blaming yourself for a change? You've been gypped, not by the company, but by a few men who are working together at your expense. The company can't stop them. Law is law, and they operate under the legislature of Earth. But you don't; you operate under the legislature of the Belt." He stared at me. "Those men can only get

away with what you let them. If you don't kick, then why expect others to? This claim jumping isn't new—you told me that yourself, but what have you done to stop it?"

"It wasn't my business," I said. "In the Belt we keep our noses clean."

"And so you got robbed. Still want to keep your nose clean, Jim?"

I didn't answer.

In two weeks I tested twenty-seven rocks and not one of them was worth the cost of the thermite charge. We passed others, plenty of them, but they were all radio-marked as registered claims. Morgan's Cluster filled the radar screen with green fire and I sweated as we dived through the erratic orbits of the fifty-eight asteroids which had caused Morgan's death. I had to use more fuel than I liked. In the Belt we use the oxy-alcohol mixture, not the atomics of the interplanetary ships. There's a good reason for it. We don't have to

worry about radiation; we can get all the thrust we need from it, and we can breathe the same stuff we use for fuel. Some prospectors drink it, too, but they must be tired of life.

As a partner, Harry turned out to be almost useless. For one thing he couldn't read a spectroscopewithout fiddling around with a stack of matching plates. For another he didn't seem to know how erratic some of the rocks are. I had to stand by for long periods and, finally, I had it out with him.

"You're no prospector," I told him. "Why did you say you were?"

"Did I?"

"Perhaps not, but you acted like one. Why didn't you tell me you were a greenhorn?"

"Would you have accepted me if I had?" He rubbed the bristles on his chin and his eyes crinkled a little around the corners. "Would you?"

"You know damn well I wouldn't." I didn't have to tell him why. When two

people work together you get so that you begin to trust each other. That's all right when you're both experienced and know what you're doing. But to rely on a greenhorn is the same as committing suicide. That's why I liked to operate on my own. If a man can't trust himself, then there's no one he can trust. Also, even though it was hard going, the profits were that much bigger.

"Mad at me, Jim?"

"Yes." I tried to get in a temper, failed, then shrugged. "What's the use? I'm stuck with you now, so shouting about it won't make any difference. But why go through all that performance? You could have grub-staked me and stayed behind at Central. An old man like you shouldn't be out in the Belt unless he has to."

"I wanted to come," he said sharply. "And a man is only as old as he feels."

"You can feel like a two-year-old," I said brutally. "But that don't make your

bones any less brittle or give you a new pump. When we start real work it's not going to be easy."

"I'll make out."

"That's what you say now, but I've seen old timers flop out before." I scowled at the radar screens. "What made you head out this way to begin with? I thought that you knew of an unexamined area."

"I've got better than that, Jim." His eyes crinkled again as he looked at me. "I know where there's a rock loaded with pay-stuff."

That just about did it. You hear the "lost asteroid" gag in every bar in the system, and I'd heard it so often that I no longer listened. Old timers mostly, trying to cadge the price of a drink or, if they think they've landed a sucker, a down payment for a set of co-ordinates dreamed up in an idle moment.

I told Harry that, and a lot more beside, and I wasn't gentle with him. He heard me out, rubbing his chin and

looking down towards his feet and, when I'd run out of words, he stared at me instead.

"Finished?"

"For now, yes."

"Then listen to me for a change. I wasn't just making noises when I spoke about Consolidated, and I'm not making them now. There is a rock out there loaded with rich stuff and we're going to find it." He smiled at my expression. "I'm not crazy and I'm not trying a racket. The asteroid is there. I can even give you the assay, and it's worth about a hundred thousand credits at market valuation."

"Then what are we waiting for?" I stepped to the controls. "Give me the co-ordinates and let's set up our marker."

"Not so fast, Jim. You can have the claim but only if you work for it. In other words, I want to make a deal."

"A deal?" I let my hands fall to my sides. "Let's have it."

"The last time you made a rich strike you were gypped. What makes you so sure the same thing won't happen this time?"

"Not a chance. They . . ." I broke off because I'd just realised what Harry was getting at. He nodded.

"That's it. The deal is that you smash this claim-jumping racket in return for the claim. In other words, if you can hang onto it, it's yours. Well?"

"Sounds good," I admitted. "But there's one more question. You're no prospector, Harry, and you talk like a man with sense. Who are you?"

"An officer of Consolidated. Surprised?"

I was.

The rock was where he said it would be, and the spectroscopic reading gave it a value about what he'd said. It had a marker on it, too, a Consolidated one, but Harry put it out of commission as soon as we touched down.

"This is an old claim," he explained. "The title's ours, but that doesn't matter. We've moved it since then and the co-ordinates will be different." He grinned. "So will the assay."

We'd taken off our suits and were resting after going outside. Carrying oxygen as fuel as we do, and cramped for space as we are, the little ships have no air-lock. It's quicker and more convenient to evacuate the ship while working, and wear suits all the time. The only trouble with that was that it made the ship cold and I shivered over the heaters as I sucked hot coffee.

"What happens next?"

"I go back with the false samples and register the claim. If our friends follow their pattern they will send a ship out here, change markers and fix the records. When I return they will warn me off. If I make a complaint I'll be laughed down. You know how it is."

I knew. I'd been through it all before.

"It's a rich claim," said Harry thoughtfully. "At least, it will look that way on the assay. I'm an old man and they'll think I'm easy meat. I can't see how they can resist the temptation."

"You've forgotten something," I said. "They'll know that we were partners. How will you explain that?"

"You died," he said calmly. "An unfortunate accident. You can guess what they'll think."

I could. More than one partner had met with an unfortunate accident just after striking it rich. That was another reason why I liked to operate alone.

"They'll use it against me, of course," said Harry. "They will probably threaten me with the law; anything to make me shut up and accept my loss." He grinned at me. "They've got plenty of precedent to go on; they know that they can get away with it."

He needn't have said that. I was becoming less and less proud of how I'd been rooked without doing anything about it. I got down to business.

"How will we clear it all up?"

"That's up to you," he said pointedly. "I'll leave you behind on your claim. When the jumpers arrive you do what you think best. I'll come out as if to make the double check and see what's happened." He hesitated. "Look, Jim, I'd like to help you but I can't. All I can do is to set the trap. Officially, Consolidated can't enter into this. Unofficially, we'll be behind you all the way. But it's up to you."

"What am I supposed to do?" I said bitterly. "Make faces at them? The last time I had trouble I was up against three men, two of them paid goons. Polite words won't persuade them to change their minds."

"Then don't use polite words."

"All right then, I'll throw

rocks." I reached for a cigarette and sucked the tip to brightness. "You played this too smart, Harry. Why didn't you tell me what you had in mind back at Central?"

"If this scheme is going to work at all then it's got to be done quietly." He sat down on the edge of the control panel. He didn't twitch or jerk or occupy his hands. He sat as an old man sits, serene and calm, and as if he had all the time in the universe. "Consolidated can't touch these characters; we've got to stay clean. The law won't touch them without evidence, which no one is willing to give. The prospectors complain and get drunk, then forget it as one of those things. Nobody gives a damn for the other fellow, so nobody has the guts to do anything for a long-term profit. It's up to you, Jim."

"I told you before. I'm no Crusader. Why should I get my head broken for someone else?"

"This time you're doing it strictly for yourself," he re-

minded. "For one hundred thousand credits. It's worth that much to Consolidated to clean up this mess before it gets out of hand."

And then I got it. For a moment I'd been tempted to swallow his line without question, but suddenly the picture became clear. Philanthropy? Not on your life. Consolidated were scared. And I knew why.

"You've waited two years to get upset about what's going on," I said. "Now, all of a sudden you start taking an interest in the poor prospectors and the claims they've been gypped out of. That's the bunk, and I know it. You're worried about your own skin and want to use me to save yourselves. Am I right?"

He didn't answer, but I knew that I'd hit the target. Consolidated had a billion credits worth of equipment out in the Belt, all of it essential if they were to remain in business. A billion credits worth of plant and machines, refineries and shipyards, stores and power plants. All very

expensive, and all very vulnerable.

A few thermite bombs set off at the right places would slow down production. A few more would wreck essential equipment and necessitate expensive replacements. Big as it was, Consolidated operated on a relatively small margin of profit. In other words, they were sitting ducks for the protection racket.

And they were beginning to get worried.

"It's the taste of money," I said. "At first the smart boys were content to gyp small-time prospectors like me. Then they got bigger, or wiser, or maybe bought more protection. Perhaps they got recruits from the Inner Worlds. Perhaps anything, but they've taken a look round and seen that the Company can't afford sabotage. How much are they asking, Harry?"

"Too much," he said quietly. "No matter how little it is, it's still too much. You can't buy off a blackmailer, and that's all they are. Once we

pay then we'll have to keep on paying."

I laughed.

Harry wasn't annoyed or ashamed, or anything like that. Instead, he went and got a couple of coffee bulbs and, when I'd finished my laughter, he handed me one. I took it and stuck the nipple in my mouth. It was good coffee, laced with real brandy and sweetened with real sugar. I enjoyed it.

"I'm not going to talk to you about ideals," said Harry patiently. "I'm not even going to say anything about loyalty or decency, or building for the future. I'm just going to talk about money." He sucked at his coffee and licked his lips.

"If Consolidated is held to ransom, you, and those like you, are going to suffer. The company is out to make money, never forget that, and if it doesn't make a profit it goes into liquidation. So any tribute we pay must be found without cutting our profit margin to a suicidal point.

Normally, the customers would pay, but as we aren't the only firm selling minerals we've got to keep our price at a competitive level. Can you tell me how we can economise?"

"Sure," I said bitterly. "You cut the price of raw materials."

"That's right. But if we cut it too much you go out of business. It would cost more to hire our own prospectors, so inevitably we'd lose in the long run. Consolidated would cut its losses and abandon the Belt. You'd have nowhere to peddle your claims, and the only people to get anything out of it would be a dirty little bunch of criminals. They'd be the bosses because they'd have the money, and you'd dance to their tune and like it. Does the prospect make you happy?"

"No one is going to push me around," I said. "I'm a free agent."

He said a word which, from a younger man, would have earned him a busted nose. The word itself didn't hurt

so much; it was the way in which he said it.

"You're as free as my Aunt Fanny," he said. "You've got to pay for every breath you take, every mouthful of food and drink of water, the clothes you wear, the fuel for this ship, the charges for the thermite gun. Free? Man, you're so loaded with financial chains that you can hardly move. Push you around? Hell, you don't need pushing. You move to the tip of a finger. Once Consolidated is out of the Belt and prices hit the ceiling you'll work for a bowl of slops and like it."

"You're talking too much," I warned. "Pipe down."

"Sure I'm talking too much. I'm telling you the truth and you don't like it. You don't want to know what's happening. You don't want to know that a gang of mobsters are taking over this decant because you and those like you haven't the guts to stand up against them. You . . ." He stopped, just in time, and

when he continued his voice was back to its old calm.

"Okay, Jim, you don't have to sock me. I'm an old man, and I've seen this happen before. They tried it on Mars and they almost got away with it on Venus. Wherever the law relaxes a little, and men are too busy to worry about what happens to their neighbours, you get the smart boys who try to cash in. Why not? At least they can work together for their mutual good. If the pigeons want to be plucked, then why have pity for them? Let the criminals take over. Let justice be sold to the man with the folding money and the right friends. Who the hell cares about the future? Skim the Belt and retire to Earth with the loot. Get wise, Jim. Being honest gets you nowhere. Buy a gun and kill a few friends and cut yourself a slice of cake."

"Cut it out," I snapped. "You don't have to try so hard. I'm wise to you and your company. If you're so clever then why don't you

clean up the mess yourselves?"

"How? Why? What's the company got to do with it? Damn it, Jim, haven't I told you that a commercial organisation has to work with things as they are, not as they should be? What's it to us if you rock-rats let yourselves be robbed? Do you want Consolidated to wet-nurse you? And if we tried it, you know what would happen? The company isn't loved, Jim, and the first time we tried anything outside the law we'd be screamed down as dictators, money-grabbers, power-mad exploiters. Let a hint of that reach Earth and we're done for. Business is a rat-race, Jim, and there are a dozen competitors after our blood. Knock us out and that restricts the supply of minerals. Short supply means higher prices. Why should we go out of business because a few men didn't have the guts to fight for their own?"

"You're too generous," I said, and reached for a cigarette. "But why depend on

me to straighten things out?"

"Because you're part of the Belt, Jim, and it's your future. Because you're a little man, and everyone loves a little man who stands up for his rights. You could commit murder and they'll call you a hero."

"Sweet talk," I said. "But I'm no hero."

"You're not rich, either," he pointed out. "If you don't want to do it for liberty and justice, decency and a safe future, then do it for the money. A hundred thousand credits, Jim. Think of it!"

I did.

Alone on the asteroid I had a lot of time for thinking. We'd swung back towards Central and, with a powered flight, Harry would make it there in three days. Add a day for landing and formalities. Add three more for the goons to come out on their claim-jumping errand. I had a week to look at the stars and sort myself out.

I had supplies and an igloo.

I could inflate it and get out of my suit while I ate and rested, and recharged the air tanks. I had plenty of the laced coffee, plenty of cigarettes, plenty of food and water.

I also had a gun.

It was a Weimar rifle, low-calibre high-velocity, with calibrated sights and a full clip of fifty rounds. I'd heard of them, but had never seen one before. You don't see many guns in the Belt. They cost a lot of money, and are about as useful as a pair of snowshoes on the sun-side of Mercury. The only thing you can do with them is to kill your fellow man, and murder, as a pastime, isn't popular.

The mere fact that Harry had brought it along showed me how serious he had been when he told me I could get away with murder. He meant it literally and, as I'd a lot of time to get through, I spent some of it in target practice. After twenty shots I knew that I could hit anything I aimed at. With no gravity to speak

of, no windage, no deviation, and with those sights, all I had to do was to point it and press the trigger. I put it to one side and gave my brain some exercise.

Things had happened too fast for my liking. I'd always been a lone wolf, and ever since I'd scraped up the fare from Earth, I'd kept clear of unions, companies, gangs and other groups and mutual-aid societies. With the Inner Worlds tied down by the big companies, the Belt offered the only place where a man could operate on his own with the chance to make his pile. If Harry was right, it was only a matter of time before the Belt went the same way as Mars and Venus.

And I knew that Harry was right.

But he hadn't told me everything. It wasn't as simple as he'd tried to make out. Consolidated wanted me to start something so that they could move in and finish it. Once I'd set the ball rolling they could take over. It

wouldn't be hard for them to use me as an excuse to demand that Earth grant them extensive powers to protect their investment in the Belt. They would coat it with a layer of philanthropy, but the facts would remain the same. Company police, company officials, company ships and supplies. Once they started they wouldn't stop until they literally owned the seventh decant.

Against that was the threat of the criminals taking over. In a war with Consolidated they would win because destruction is easier than construction. They could hold the company to ransom, bribe officials with the money so obtained, and extend their power over every man in the decant.

To stay alive in space you've got to have air and fuel, food and water. Someone's got to import those things, and once they gain control of them they hold a pistol at your head.

Let either side gain full control and it would be im-

possible to enter a dome, refuel a ship or buy food without their permission. The tariff would rise to the sky and we'd have to jump every time they cracked a whip in order to stay alive.

A nice prospect—and I was in the middle of it. I had a week to think about it, and I covered it from all angles. In between bouts of brain-work, I sat and smoked and drank the laced coffee, while the stars swung around me and I tried not to feel lost. I checked my suit and made sure the compact recording machine Harry had left was in good order. I did everything a dozen times, and was just ready to go space-crazy with boredom when time ran out and things began to happen.

The goons were early. I'd caught a glimpse of their jets and had time to deflate the igloo and stack it away under a rock with the supplies and recorder. I took the rifle and hid behind a rock overlooking the squat bulk of

the radio-marker. I'd plugged in my contact belt and, as soon as the ship landed, I heard voices on the general band echoing from my radio-cap.

I pressed the radio relay to the recorder, settled myself more comfortably and waited.

I didn't have to wait long.

The door opened and air made an expanding mist of ice.

Two men came out, looked around for a moment, then headed towards the marker.

"What'll we do with it, Jeff? Smash it or take it back with us?"

I didn't know which of the two was talking, but it didn't matter. I crouched lower and stared through the sights of the rifle.

"Take it back with us, of course," snapped Jeff. "These things are worth money. We can file off the number, adjust the pulse, and sell it. You ready to take the bore, Sam?"

"Just getting my gear." A third figure jumped down

from the ship. He carried a lot of equipment. "How about you giving me a hand?"

"Let's switch markers first." The first man who had spoken reached out his hand towards my marker.

I shot him through the body.

"All right," I said. "Stay where you are. If anyone wants to try anything I'm ready."

"Fred!" Jeff moved towards the dead man then halted as I sent rock splinters flying from next to his boot.

"I'm not just talking," I snapped. "I'd as soon kill you as not. Stay away from that marker."

"Now wait a minute." Jeff turned and I could see the starlight glinting from his helmet as he tried to locate me. "You've got us all wrong. We just touched down to do some repairs."

I didn't answer.

"Look," he said. "There's no need for all this. Come out and we'll have a talk. Where are you?"

I still didn't answer.

"You've killed Fred," he said, and his voice was ugly. "That's murder."

"You louse!" I had to stop myself from killing him where he stood. "So it's murder, is it? What do you call it when you claim-jump? This is my rock and I'm keeping it."

"Okay, okay, so who's arguing?" Jeff looked for me again, but I was well hidden. "So we made a mistake, that's all. Just let me pick up Fred and we'll get moving."

"Stay where you are."

"Listen," said Sam. "I don't know who you are, or where you are, but you're asking for trouble. We just touched down for repairs. You killed one of us. You're in a spot, mister."

"I don't think so."

"Then think again. You're trigger-happy. We didn't do anything wrong, and you can't prove we did. When we get back to Central we'll file a complaint. You can't get away with murder, not in the Belt you can't."

"You're a couple of claim-jumpers."

"Us?" He laughed. "Don't be silly. Try and make the police believe that."

"They'll believe it." I sent another shot close to Jeff's boot. "I told you not to move. I'm coming down, and if one of you as much as lifts a hand I'll let you have it."

Slowly I rose and kicked myself down towards them. I stumbled as I landed, but recovered without losing control of the rifle. I wasn't sure if they were armed or not, and I didn't want to take chances. I kept staring at them as I walked nearer, my fingers tense on the trigger in case they should try anything. I didn't look towards the ship.

That was my mistake.

Something slammed into my left leg and knocked me down. I could hear the hiss of air as I fell and my leg felt cold and hot at the same time. I twisted and jerked back the trigger to automatic fire, spraying lead towards the

running figures of the two men. Then I rolled behind a rock and gave myself some first-aid.

I had to move fast because I'd lost a lot of air, and blood. I tore off the sling of the rifle and twisted it around my thigh above the gash in my suit. I tightened it until the hissing stopped, then I snatched up the rifle and sent three shots towards the closing door of the ship.

It stopped closing, and I had time to realise what had happened. There was a fourth man in the ship. How he had missed killing me I didn't know, but he'd probably had a hand gun and wasn't too good a shot. Both Jeff and Sam lay where they had fallen. I didn't worry about them; they couldn't hurt me any more. The fourth man could.

"Come out," I said. "Drop your gun and come on out."

"Not a chance." He was breathing hard and I wondered if I'd winged him. "You can't hurt me in here."

"That's what you think."

I stared through the sights and fired at the hull. The skin of a spaceship isn't very thick, it's only needed to keep in the air, and the Weimar was a high-velocity gun. The bullet went through the hull as if it were paper.

"Come out or I'll puncture your fuel tanks. Come out or I'll smash your controls. Come out, damn you!"

"Hold it, I'm coming out."

A figure appeared at the open door, hands above its head. I blinked at it; it seemed to waver and blur, and before I knew it, he was half-way to me. "You're hurt," he said. "Let me help you."

"Stay where you are." I was hurt, my leg felt like hell, and I knew that unless I did something pretty soon I'd pass out. I tried to hop towards the ship.

I saw his gun just in time. He had tucked it behind him, and as he swung back his arm I caught the glint of starlight from the metal. We fired together. Where his shot went I didn't know, but my

own bullet took him smack in the face-plate. I watched him fall and then I was flat on my face with everything dimming around me.

"Harry," I said. "Harry, where the hell are you?"

I was crying with weakness. "Harry! Come and get me, Harry, Harry . . .!"

I was still crying when I passed out.

I opened my eyes and stared at a green-tinted ceiling. I lay on something soft, and the air smelt pure and fresh. I sat up and grabbed at my left leg. It was still there, and I relaxed. Harry came into the room as I was reaching for a cigarette. He handed me one and sat down beside the bed.

"We picked you up just in time," he said. "You'd lost a lot of blood and your leg was badly frozen, but you'll be as new in a couple of weeks." He took something from his pocket and handed it to me. I stared at it. It was a cheque for one hundred thous-

and credits. "For your claim," he said, and winked.

"Thanks." I tucked it beneath my pillow. "Did you get what you wanted?"

"Yes. The recording cleared you, and so did the evidence of the police we took with us out to the rock. Jeff wasn't dead when we found him and he spilled everything. The recorder has been impeached for conspiracy, half the police have resigned, and most of the claims office staff have been arrested." He stared at his finger nails. "You did a good job, Jim."

"You did a good job," I corrected. "I was just your stooge, the man who pulled the trigger so Consolidated could keep in the clear. What happens now? Do you get what you wanted? Sovereign rights in the seventh decant so that you can protect your investment, and everything made smooth so that the Company can concentrate on the job of making profits?"

"What makes you think that, Jim?"

"I had a week to think about it and, believe it or not, I'm not quite a moron. Criminals or businessmen, what's the difference? Both are out to make all they can."

"There's a big difference, Jim," he said quietly. "A very big difference. You, like most people, have the wrong idea about business. We want to make a profit, sure, but what's wrong in that? To make it we must have labour; that means we must employ people; they benefit, we benefit, and civilisation mounts a little. How else can the Belt be developed? Who else but Consolidated would pour millions into this decant and so provide everything you and those like you need to exist?"

"You talk well, Harry," I said tiredly. "You talk so well that I almost believe you, but not quite. A company, you told me once, has no heart or soul. It has an object and it will do anything to obtain it. Individual officers of a company have to fit their own ideas to the overall pattern."

They have no individual responsibility, they go by the book, and they feel no guilt at what they do. And never forget this: it's the customer, the small man like me and those like me, who have to pay, and pay, and keep on paying. Consolidated, like any other big business, is a potential dictatorship"

"That's nonsense."

"Is it?" How long will it be before you and the other companies begin forming price-rings? What about the cartels and monopolies? Business doesn't like competition, Harry, it's bad for profits. A dictatorship doesn't like competition, either. No, Harry. When a thing gets too big it goes bad. It loses the common touch and thinks in terms of units instead of men and women. Consolidated can take over the Belt, yes, but only as far as we let it."

"We?" He looked surprised. "Aren't you going to retire? Go back to Earth and enjoy your money?"

"Should I?"

"Why not? Isn't that what you wanted it for?"

"Perhaps." I stared at him. He was smiling, his eyes crinkled at the corners and, though he was dressed in expensive synthsilks, he looked just the same as when I had met him in Carmodine's bar. "Am I still a fall guy, Harry?"

"Isn't that up to you, Jim?"

"I'm not so sure. One man can't beat a system, and one man can't beat a company. Not even with a hundred thousand credits behind him. Suppose I stay here and do what I think should be done? Would I stand a chance?"

"That's up to you, Jim."

He smiled again, and then became serious. "You're right about business, Jim. Nothing that is soulless can be trusted. No company means to be that way, but to survive at all they have to be ruthless. And they grow, Jim. They can't help but grow. Success and growth go hand in hand. The danger is that they will grow too

big. Something has to keep them in check. The law can't do it; they operate within the law. Individuals can't do it. Who cares for the grievance of a single man? The public must do it. The consumers and customers, the people who, though they never realise it, are more essential to the company than the company is to them. If the public let themselves be exploited then they must blame themselves, not the companies who do the exploiting."

He rose and held out his hand.

"Think about it, Jim. Society needs balance to remain healthy. Too much organisation is as bad as too little. Together the public and the companies can turn the Belt into a new world. But if one operates without the other, you'll wind up with something not fit to live in. Do I have to tell you what should be done?"

He left then and I smoked

and stared up at the ceiling as I thought about what he had said. We needed balance, and that meant arousing the seventh decant to an awareness of what it was. We needed a police force, public utilities, safeguards against exploitation. At the moment I was a hero. I could talk and the others would listen, and it wouldn't be hard to get something started.

I could even be Mayor.

I smiled as I thought about it; then as I remembered the cheque I lost the smile.

Was that what the company wanted?

A thriving community so that people could buy more goods and so increase the profits? A new source of labour and a new market for their products? Was I just their stooge?

I thought about it until I fell asleep. I dreamed of intermeshed wheels and, when I awoke, I felt like hell.

But I was going to do the job.

Can we solve the problem of—

FOOD IN SPACE

by KENNETH JOHNS

THE EARLY, CHEMICAL fuelled, rockets will need months to travel from Earth to the nearer planets, years to reach the outer planets. The spacemen aboard them will need regular meals to keep them mentally and physically fit.

Food must satisfy two requirements. It must contain energy-giving materials which are burned in the body to provide heat and muscular energy. Fats and carbohydrates are of this type. But food must also contain supplementary dietary factors in small quantities to regenerate old cells in the body and keep the body in good running order.

The human body is like a self-repairing engine, but it must have fuel, raw materials to replace worn out parts and vitamins to lubricate the system.

The available energy in food is calculated as calories—on the basis of the burning of fuel to carbon dioxide and water. One calory is the amount of heat needed to raise the temperature of one

kilogramme of water by one Centigrade degree.

In 1950 the British Medical Association worked out the number of calories a day required by men in different jobs. It ranges from 1,750 calories for a person confined to bed, through 2,750 calories for those engaged in light work, to 5,000 calories for those who do very heavy work. (It is noteworthy that women need 250 to 500 calories less for equivalent jobs.)

Spacemen will not be slaving away at manual labour, so we can take 2,750 calories a day as our standard for them. Their bodies will have less work to do in below normal gravity conditions, even whilst they are resting, and they may well get fat on this diet.

All the energy from their food will ultimately appear as heat, roughly the amount of heat given off by a continuously burning 150 watt electric light bulb.

The most concentrated and easily assimilable form of food is sugar. Starch and other carbohydrates are broken

down in the body to sugars. If the sole purpose of food was to provide energy then just over one and a half pounds of sugar a day would meet all the requirements of 2,750 calories.

But man cannot live by sugar alone. Alongside the energy-giving carbohydrates he needs proteins, vitamins, water and traces of elements such as calcium, phosphorus, iodine and iron.

Each spaceman will need about three ounces of protein, such as meat or yeast, a day, together with .0008 grammes of calcium, .012 grammes of iron and .0001 grammes of iodine. All these must be in forms easily absorbed by the body.

His major vitamin needs will be covered by 5,000 International Units of vitamin A and carotene, .0011 grammes of thiamin, .011 grammes of niacin, .0016 grammes of riboflavin and .020 grammes of vitamin C. These can easily be carried in pill form and will take up only one or two pounds of mass.

Trace elements and vitamins are, in the long run, just as essential as carbohydrates and proteins.

Making allowances for the protein and a small amount of

water in food, the total amount of food required by each spaceman works out at *two pounds* a day. This is the same figure used in calculating the weight of food needed by polar explorers.

So, a two-man, 500-day journey to Mars and back will require a larder stocked with *two thousand pounds* of food.

What types of food will be carried? Obviously tinned and bottled foods have a great deal of waste mass in their packing and water content. Dry foods, such as wheat flour, dried meat and dried yeast will be most suitable.

Flour, whilst being composed of 48 per cent. carbohydrates, contains 9.5 per cent. protein, 2 per cent. of trace elements and sufficient vitamins to be almost a complete food on its own. Dried meat and yeast have very high protein contents, whilst yeast is particularly rich in trace elements and vitamins.

But there is an alternative to carrying all the food along. Last month we considered the use of the green algæ, *Chlorella*, as a means of purifying the air, removing carbon dioxide and replacing it with oxygen. If we can use the *Chlorella* plants as food,

burning them in the spacemen's bodies to carbon dioxide and water, we can complete the cycle.

In this way the spaceship becomes almost as self-sufficient as a planet.

It will be difficult to maintain an exact balance but it can be done—and there will be little else for the spacemen to do in the long months travelling between the planets.

Chlorella grow in a solution containing nitrogen as ammonium sulphate, together with phosphorus, potassium, magnesium and iron. The tanks or pipes containing this solution must be illuminated with sunlight or blue or ultraviolet light. And the algæ must be fed with carbon dioxide.

Not all the nutrients for the solution need be carried. It is possible to sterilise the sewage and waste material and add that to the tanks—sewage already contains most of the necessary foods for the algæ, and bacteria can be used to break down the more complex parts.

Each Chlorella grows to maturity in about half a day, so it can be "cropped" for the two main meals. The green suspension is run through a centrifuge, where most of the

water is extracted, leaving a green paste.

This is cooked to give a spinach-like food. Simple steaming results in a food yielding 50 per cent protein and 10 per cent. soluble carbohydrates, easily digested. But the proportions can be varied. Young Chlorella plants are richer in protein and the older they grow the more carbohydrates and fats they produce. These proportions can also be varied by altering the light intensity in which they grow.

Just what quantities of algæ will need to be carried by spaceships?

On the Earth's surface, using sunlight at an average efficiency of utilisation of 10 per cent., an acre of algæ will produce 50 tons of food a year. Aboard a spaceship, under artificial conditions, using fluorescent lighting, it should be possible to increase the efficiency to 30 per cent. and to double the light intensity. And the algæ will continuously grow in the absence of nights.

Twenty square feet of surface should provide two pounds of algæ a day under optimum conditions—enough for one man.

The algæ suspension will

not be spread out in trays. Quite apart from the difficulties of doing this under conditions of low gravity, it is an inefficient, space-consuming set-up. The algæ will be kept in illuminated plastic tanks and pumped through flexible plastic tubes around fluorescent lamps. Air and the suspension will be squirted through the tubes at such a high rate that there will be intimate contact between the gas and the liquid so that the carbon dioxide dissolves in the water. Back in the tank, the carbon dioxide will be used up and the suspension again recycled. The air/suspension mixture, in the absence of gravity, will be separated in a cyclone separator or centrifuge.

Twenty square feet of surface needs only a single tube six feet long with a diameter of two feet, small enough for several of them to be packed into a corner of the cabin.

The two pounds a day of algæ will be eaten with about half a pound a day of other food, such as flour. The flour can easily be baked to form bread and rolls.

It looks as if algæburger is going to be a standard diet in the first spaceships.

Algæ are such prolific users

of carbon dioxide that the amount of food produced can be quickly increased by adding more carbon dioxide to the air. In fact, spacemen may take extra supplies of carbon dioxide aboard when they reach the outer planets—and carbon dioxide has always been considered one of the chief enemies of the closed-system spaceship.

Much of the atmospheres of the outer planets is methane. Methane can easily be burned with oxygen to give carbon dioxide and water. The water can be electrolysed to give hydrogen and oxygen, and the oxygen burned with more methane . . .

And ammonia from other atmospheres makes an excellent fertiliser for algæ as well as giving nitrogen and water when burned with oxygen.

An alternative to cycling the whole of the air of the cabin through the algæ tubes is to condense out the carbon dioxide by freezing and use the concentrated gas to feed the plants.

Other algæ may be used. *Anabaena* grows as long filaments and is blue-green in colour. It has the added property of "fixing" nitrogen from the air, using it instead

of ammonia. Its protein content is three times that of *Chlorella* and may be used where small quantities of high protein food are needed to add to a diet.

Bacteria will be selected to grow in the algæ suspension. They will live on the decaying algæ plants and undecomposed sewage, thus cleaning the suspension, and they will produce antibiotics to inhibit the growth of harmful bacteria. They will also produce vitamins—it is within the bounds of possibility that by the time mankind is ready to probe the deeps out to Pluto, the ships will be able to carry every biologically necessary food—synthesised within their tanks of microflora.

Although most of the water used by spacemen will be recovered and distilled, there will be inevitable losses. About a pound a day for each member of the crew must be used to top-up the system.

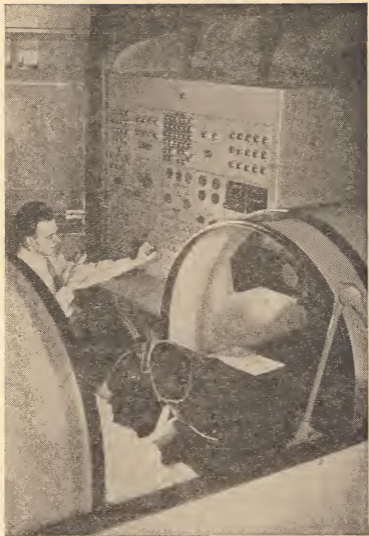
Storage of food and water will be a minor problem. The dried foods can be stored in plastic bags weighing only a hundredth of their contents. Care must be taken that fine powders such as flour do not get into the air and block up the air conditioning unit. Flour is ideal in this respect, as

water can be injected into a plastic bag and the whole mixed to a dough before taking it out of the bag. And dough conveniently sticks to any surface.

Water will be carried in lightweight flexible plastic tanks.

Cooking will be another minor problem. It will be difficult, if not impossible, to boil or fry under free fall. A centrifugal device could be designed, but its extra mass would not really be worthwhile. Baking and steaming will cook most foods. Tea will be impossible to make without boiling water at one atmosphere pressure, but coffee can be made in a small pressure vessel lined with a flexible plastic. Even coffee would have to be cooled before serving in plastic squeeze bottles.

Already we are filling in the picture of what life will be like aboard the first spaceships. A concentrated effort will have to be made to enable one article to do the work of two. We can look forward to a very rapid solution to most of the purely physical problems, unless the unknown factor *x* enters the equation—and then, eventually, we shall conquer that.



Will we ever have—

Make-Believe Spaceships?

WHEN THE FIRST manned rocket ship blasts off from the Earth and heads towards the Moon, one thing will be certain; it will be the most expensive bit of machinery ever to have risen into the atmosphere. It will be so expensive that nothing will be left to chance, and the crew, the human element, will have been trained to the utmost. This is obvious when you think about it. It takes quite a few hours of training before a person can handle a relatively simple machine such as a car and, the more elaborate the machine becomes, the higher the degree of training required. It takes longer to train a pilot than a driver. It takes longer to train a pilot of a high-speed, high-altitude plane than a pilot of a slow, simple, pleasure craft. To train the crew of a spaceship is going to be the hardest thing of all, for obviously the only way to train a pilot is to let him fly the machine.

Unless a substitute can be found.

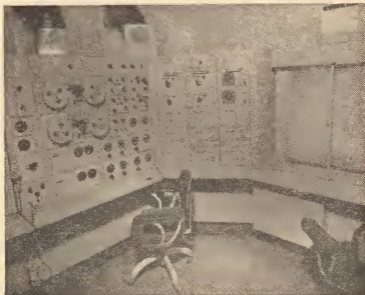
The Link Aviation people have found what appears to be the answer, and with their latest developments in building Flight Simulators, have shown how it is both possible to have your cake and eat it.

A Flight Simulator is a machine which, while never leaving the ground, can simulate any and all conditions to be met with during actual flight. With the use of the simulator instruments and radio equipment, cross-country flight problems may be flown under near-real conditions with realistic effects of lightning, crash static, precipitation, clouds, rough air and a variety of emergency situations all available at the flick of a switch.

As the simulator has been designed to train military pilots, great attention has been paid to the simulation of "enemy" aircraft which are registered on the primary instrument in the radar operator's cockpit, his radar scope,

the basic instrument in all search and intercept missions. Through it, target planes are detected and intercept courses established. A duplicate repeater is located on the radar instructor's panel. Equally important is the pilot's scope which supplies him with necessary information to guide the aircraft throughout the attack phase of an intercept. A warning light also tells him when his rockets are all fired.

Two targets are provided for radar search, track and intercept problems. These targets may be manually operated or introduced automatically from pre-arranged recordings. With the latter it is possible to run ten different problems for each target from a single tape. Scoring equipment records time on track, time on search, and the number of hits and misses. The system also simulates



Section of radar instructor's area showing radio and radar simulation facilities

interference—clutter, jamming, noise, ground return and low voltage effect.

While this equipment is primarily intended for the training of war pilots, yet it requires little imagination to see how easily it could be adapted for space flight. Meteors are still an unknown hazard, and a constant radar vigil will be necessary to spot and, if possible, avoid any contact with these cosmic vermin. Also, assuming that artificial satellites will, at that time, be orbiting around the Earth, spotting, tracking, intercepting for landing or evading for clear passage will be essential.

In addition to its complicated radar simulation, the Link Flight Simulator is equipped to teach pilots the procedures and techniques of flying high-speed planes. So close is this duplication that, for practical purposes, the simulator may be flown by following the flight instructions in the operational handbook of the aircraft which the simulator has been built to represent.

Airplane feel has been given special consideration. In an effort to make this important aspect of flight training real

to the pilot, Link engineers designed and constructed a special analogue computer to translate aircraft flight data into terms of dynamic response, such as the response to certain rolling, pitching, or yawing disturbances. These responses are built into the simulator and, as a result, handling the simulator is like handling the aircraft itself.

The simulator, far from being an interesting accessory to aid the training programme, can in itself actually train crews better than actual aircraft. The placement, appearance and function of all switches, controls and instruments found in the aircraft are duplicated in the simulator. So close is this duplication that crews can become familiar by sight and by touch with the entire cockpit without setting foot in the plane.

Routine and special pre-flight checks, essential while actually flying, are all incorporated in the simulator, and simulator take-offs can be varied as the problem demands. They can be made with or without rocket assistance, with light loads and heavy, with proper or improper centre of gravity. They can be normal or beset with

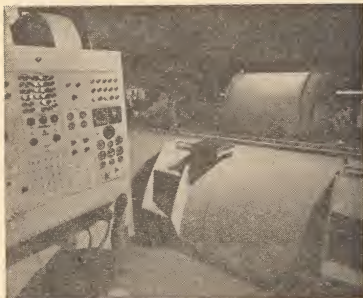
any form of trouble imagined by the instructor.

In normal flight the simulator matches the aircraft in performance and speeds. It climbs as fast, flies at the same speeds, and reacts to control pressures just the same as the plane. Thrust and drag are realistically presented, as are altitude effects and fuel consumption rates.

For oversight or lack of ability the pilot pays a penalty in the simulator just as he

would in the air. There is high and low speed buffeting, indicated through actual movement of the seat and stick. The normal flight pattern is further upset when fuel distribution becomes unbalanced or there is a shift in the centre of gravity.

For training in emergency flight procedures the simulator is better adapted than the plane. Hazardous flight situations—many too dangerous to risk attempting in the air—



External view of F-89D Flight Simulator

can be created in the simulator without fear of loss of life or equipment. Such situations include: engine failure or malfunction, overspeeding engines, complete loss of engines, icing, electrical system failure including inverter failure, over-voltage on generators, circuit breaker failure, and many mechanical failures caused by breakdowns.

The simulator also provides for detailed instruction in instrument flying and radio navigation. The flight instructor has four recorders—a ground position recorder, an azimuth and range recorder for approaches, and an altitude and glide path deviation recorder for use with instrument approach and landing systems—for reference during and after the flight.

The simulator itself is a complex and precise mechanism, a self-contained unit less than 24 feet long, 23 feet wide and 10 feet high, and occupies approximately 545 square feet. The flight control centre of the simulator is the flight instructor's console. This contains remote flight and engine indicators which provide the instructor with the same information available in the cockpit. In addition,

monitoring lights on the console panels keep him constantly aware of the status of the simulator's flight. There are also variation controls and switches which enable him to affect the engine and aircraft systems as the problem demands.

The radar instructor's console is fixed against the rear wall of the simulator adjacent to the cockpit. On it are all the controls and recorders which govern radar simulation. The radar console also contains controls for governing the radio systems, transmitters and type and amplitude of static.

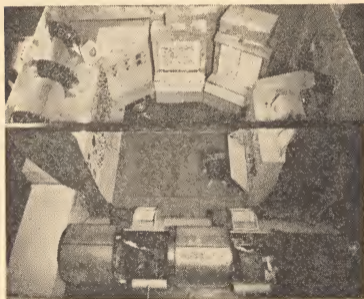
And so there you are. Already mechanisms have been constructed to simulate dangerous conditions in safety so as to train aircrews. It is but a step further to build a more complicated mechanism which will duplicate the hazardous conditions of space flight. The aerodynamics will be relatively simple, but simulating high-G acceleration, the abrupt change from high gravity to free fall, the spinning and noise, the simulating of, as yet, imperfectly known conditions, will tax the ingenuity of the engineers to the utmost.

AUTHENTIC SCIENCE FICTION

But it will be done. It will be done because it will have to be done. No nation can afford to entrust the fabulously expensive machinery of a spaceship to any but a fully-trained crew, and training them on the ground by means of a simulator is the only practical method of making sure that,

no matter what the emergency, they will be able to meet it.

Maybe we shall soon be seeing space pilots who, though fully trained, have never set a foot off the ground. Why not? We already have make-believe aeroplanes. Why not make-believe spaceships?



Overall view of Flight Simulator

Photographs courtesy Link Aviation, Inc.

Men built the ships, but getting them into space was—

A WOMAN'S WORK

by E. C. TUBB

JOHN WAS MORE WORRIED that evening than she had ever seen him before. Not even that time three years ago when they had first met had Margaret known him so distraught, so torn by inward conflict. He threw down his book and glowered at the wall, his dark, curly hair rumpled from the frequent passage of his hand, his pale blue eyes strained and elusive in the taut pallor of his face.

"I can't do it," he said. "I just know that I'm going to fail."

"That's nonsense," said Margaret. "You won't fail." She said it firmly, determinedly, as if the very act of saying it would make it a fact. "You can't fail, not now, not after all these years."

"I don't know," he said dubiously. "I just don't know."

"I do." Margaret smiled at him, and rising from her chair crossed the room to-

wards him. She moved with a lithe grace impossible to find in any woman who had yet to reach maturity, and as she stood beside him she stroked his hair with a gesture at once that of a mistress and a mother. "You're worried," she soothed. "You've been studying too hard. You'll pass the exam and you know it." She laughed with forced humour. "You can't let me down now, John, not after all this time."

"Would it be letting you down?" He turned and his arms went around her, his face pressed against the warmth of her body. "If I do pass, Margaret, you know what it will mean?"

"I know."

"I shall be sent to space school. I shall have to leave right away for the base on the Moon there to train as a pilot. I shall have to leave you."

"Of course." She smiled down at him, her fingers stroking his hair, and again felt the warning tenderness rising within her. She loved John. To have done what she did without love would, for her, have been impossible, but she loved something more. To her John was the symbol of her real love, the transient image of flesh and blood which she could nurture and help, and then pass on to do that which she could not. To lose John in the face of that greater love would be nothing but to fail . . .

She did not like to think of failure.

"You have been so good to me, Margaret," he whispered, and she felt his arms tighten around her as he spoke. "I was desperate when we met, everything seemed against me. I couldn't study and I couldn't even think straight." He lifted his head and smiled up at her. "What was it that made you help me?"

"I don't like waste," she said. "I don't like to see

someone with ability losing his chance through no fault of his own. It seemed logical to me to help you if I could." Again her fingers caressed his hair. "Have I been of help, John?"

"Yes," he said sincerely. "More than you know."

"Nonsense," she said lightly. "A few meals, a little comfort, a shoulder to cry on and someone to encourage you. Did it mean so much?"

"It meant everything," he said fiercely. "Without you I should have gone under, I know it. If I pass the exam I shall owe it all to you."

It was the simple truth. She knew—who better?—that without her, John would have abandoned his studies. To some men adversity was a challenge, but to others, the weaker ones perhaps, adversity dulled and blunted the edge of their high purpose. At eighteen John had been filled with a dream. At twenty, when they had met, he was on the road to disillusioned despair. Now, at twenty-three,

he was a finished product, able and fit to enter on his career.

Margaret felt the warmth of success as she looked down at him. Tomorrow he would sit for the exam. He would pass it, and by so doing, pass out of her life. And that was the very thing for which she had been working these past three years.

"Get on with your reading, John," she said softly, and gently disengaged his arms from around her. "I'll make coffee and then you'd better be going. You'll need to be fresh for the morning."

He smiled at her and dutifully reached for his book, but it was only a gesture because, when she returned from the kitchen with a tray bearing cups and sugar and milk, he was staring at the wall, the pages unturned.

"Lazy." Margaret poured and handed him his coffee. "Still, I suppose that you deserve one evening free. Too much study can make you stale."

"Yes." Absently he stirred his coffee, drank, and then, to his surprise, Margaret had removed the cup and was urging him from the room.

"Off you go, John, and get a good night's rest."

He nodded, still thoughtful but, as usual, yielding to her dominance. At the door he turned, and holding her arms stared directly into her eyes.

"Why, Margaret? Why did you do it?"

"Do what?" Her voice was sharp with the sharpness of anxiety. "What are you talking about?"

"Tomorrow I shall sit for the exam," he said deliberately. "I shall know the results directly after, and you know how they work. If I pass I shall leave at once for Tycho. If I pass I shall never see you again, Margaret. Do you realise that? I shall never see you again."

"Well?" She met his stare, and beneath it his eyes faltered. "That is what you want, isn't it? That is why you have studied these past three years."

"I suppose so," he said slowly, and bit at his lower lip. "But . . ."

"Goodnight, John."

"But, Margaret! I . . ."

"Goodnight, John."

She closed the door in his face.

It was hard to shut him out like that, harder still to ignore the pleading in his eyes, his obvious need for her, but it had to be done. For three years now she had known that it had to be done, but now that the moment had arrived and passed, she had to remind herself of many things before despair yielded to jubilation. But when elation came, it was all the more overpowering because of her previous depression.

She smiled and glanced around her room. Books lined two of the walls and the framed astronomical portraits matched their titles in subject. Gently she touched them, letting her fingers run over the battered spines of the volumes, the slick glass covering the portraits.

This was her life. The other, the routine of day to day existence, was nothing; this was all. This was the dream which filled her, the greater love, beside which that she had for John as a man was negligible. She loved him, yes, in her fashion, but her real emotion for him, the deep-down, well-hidden emotion which she felt every time she looked at him or thought about him and others like him, was not love at all. That emotion was pure envy.

She had been ten when she realised that she had been born the wrong sex. She had been twenty before she had been able to accept the fact that there was nothing she could do about it. She had been thirty before she had been able to make a compromise with herself and accept reality and the need for substitution when every atom of her whole being cried out for what she could never have. It had been five years later that she had found the substitute, and for the past

three years she had known what happiness a complete submission could bring. She herself could never reach the stars, but John, aided and helped by her, could.

In his success she would find her own.

The lights were too bright and they hurt her eyes, but she had not complained before because John had needed bright light by which to read. Now she dimmed them, cutting out the central light and plunging the room into semi-darkness. Tiredly, she sank into a chair, letting her body relax for the first time that evening, and alone in the semi-darkness, yielded herself to the pleasure of her thoughts.

John had asked her why. And she had not answered.

She wondered if, knowing the truth, he would still hold her in such high regard. Men, all men, had childish, petulant emotions. They could bear to be loved for themselves, little as they had to offer, but they could not bear to be loved for

what they possessed or for what they could achieve. Margaret did not love John, had never loved him in the manner he desired. She had loved what he represented, and because of her empathy with him had felt genuine affection for him during the past three years. That affection had permitted her to shelter him, cherish him, give to him what she would hesitate to give to another, but it was not love.

She dared not let it be love.

She dared not, after all these years, let her own feminine emotions stand in the way of the greater ideal. She had controlled her emotions and used them for the greater end. Now it was over. Now she, through him, would taste success. The past three years had been far from wasted.

And yet, despite her cold logic and the firmness of her purpose, she could not help thinking of him.

Not even in sleep.

Morning came, and with it the terrible self-searching be-

fore the cynical mirror. Tired eyes, tired skin, tired muscles and tired brain all stared at her from the smooth surface and mocked at her pretensions to youth. A shower helped, and coffee helped more. Clothes, the great morale builder of one half of the human race, helped still more, and by the time she was ready for business she felt as assured and as smart as she ever did in the morning.

Work was the usual round of passing out potted adventures and emasculated romances to a thrill-hungry public satisfied with vicarious pleasures hired from the library. They were as unreal as the books they read, pale men and nerve-wracked women, all heavy with the conscious knowledge of their wasted lives, none of them either knowing how or having the courage to do anything about it.

Lunch came and the temptation to phone the Academy and contact John. She resisted it, and later in the day, when

the rush had died and there was time for thought, she knew that she had been right. Later, too, came the time when her headaches began, and the dull ache of frustration made her doubt even her own values.

Had she been a fool? Was she being a fool to dedicate herself so whole-heartedly to an ideal? Did she, unattractive, nearing forty, myopic and too-inclined to share the burdens of others, hope to be a second Helen of Troy? She fought down the self-doubts as she had done so often before. Perhaps she would never be able to launch a thousand ships, but via John she would be able to launch one, a spaceship, and with that she would be satisfied.

And she knew that John could not fail. Could not! Not after her guidance and tuition, her knowledge and coaching, her insistence and submission during the past three years. She did not think of it as sacrifice, to her John's success would be gain, not loss,

and a part of her would go with him into the wastes between the stars.

No, she had not wasted her life.

Evening came and the time to go home. For once she did not join the rush, but instead lingered for a little while, conscious of the fact that now there was no need of haste, no meal to prepare, nothing to demand her whole attention. So she walked, taking her time, and it was long after her usual hour that she finally reached home.

She sensed something wrong as soon as she opened the door.

It was nothing immediately apparent, more of an intangible, but as she stood in the doorway she felt her heart pound with sudden trepidation.

Then John rose from where he had been sitting, hidden by the back of the big arm-chair she had bought for his comfort while reading and, smiling, walked towards her.

"Margaret! You are so

late! I was getting quite worried about you."

"John!" She stared at him as though he had been a thing of vapour instead of too-real flesh and blood. Then the door swung shut behind her. She was walking across the room, her coat was on the rack, and by the time she faced him, her heart had steadied from its pounding.

"Aren't you glad to see me?" He stared at her, his blue eyes puzzled, his hands half-extended before him in mute appeal. "I've been waiting for hours."

"Have you?" Margaret took a deep breath. "I didn't expect to see you. What happened?"

"Happened?" He frowned at her, avoiding her eyes. "Why, nothing. I just thought that you'd be pleased to see me. Aren't you?"

"I don't know." Even to herself her voice sounded strained and brittle and, deep inside of her, gladness welled at the sight of him. But there was something deeper,

stronger, and that something looked at him with hurt and pain. "Well?"

"Well, what, Margaret?"

"You know what I'm talking about," she snapped. "I never expected to see you here and you know it. By now you should have been getting ready for your trip to the Moon." She stared at him with sudden hope. "They've changed the routine, is that it? You've got a day or so before you have to leave. John!" Suddenly she was beside him, her arms around him, gladness washing away her hurt and fear. "Oh, my dear, I'm so glad that you didn't have to leave right away."

He didn't answer, merely held her close, and his silence quelled her emotion so that she pulled away from his embrace and stared into his eyes.

"It is that, isn't it, John?"

"No," he said bluntly. "I failed."

"You failed!" She stared

at him as though he had uttered an obscenity. "But how could you fail? It's impossible! I know that it is impossible!" She was crying with the sheer impossibility of it all. Three years and he had to fail!

"All right," he said, and now there was a new tension in his voice. "I didn't fail. I didn't sit for the exam. I couldn't, Margaret, I just couldn't. I would have passed, I know it, and I couldn't bear the thought of leaving you. It wouldn't have been fair, not after all you did for me." He frowned at the expression on her face. "Damn it, Margaret, don't look at me like that. What kind of a man do you think I am, anyway? I owe you something and I know it. You love me, you must do, and I simply couldn't hurt you so much."

"Hurt me?" Her lips felt numb and her hands had begun to tremble. "Hurt me?"

"Yes." He scowled at the floor. "I know how you feel

about me, Margaret. No woman not hopelessly in love with a man could do what you did for me. I want to repay you for what you did. We can be married. I know you'd like that, and . . ."

He said more but she didn't bother to listen. He, sorry for her, and offering his concept of full repayment for what he considered he owed her, making what he, in his conceit, thought was the supreme gesture. But why? Why?

Looking at him, Margaret found her answer.

John was, and always had been, a coward.

Adversity had driven him into an attempt to escape, and space service, with its high pay and total welfare, had offered him a refuge against the world. There was more to it than that, of course. Pioneers are always men who are running away from something, and how much further could a man run than into space? Alone, he might have

made it. Alone, driven by fate, he would have been forced to sink or swim, but Margaret had found him and helped him.

And by helping him she had ruined him.

She had given him comfort, love, warmth and happiness. She had given him everything she possessed, and by so giving had taken away his need for escape. Now there was no force driving him towards the stars. Now he was willing to sell his opportunity for a comfortable marriage and a snug home. Basically, he was afraid of space, and in an attempt at self-justification, was making what he thought was a noble gesture in blaming his cowardice onto his regard for her, robbing her of the vicarious success for which she had dreamed.

And it was all her own fault.

"You fool!" she said bitterly. "You utter fool!"

But she was not talking to John.

It was curious he should give a

GRANT IN AID

BY SYDNEY J. BOUNDS

I HAD MY FEET UP AND A bottle tilted to my lips when the door opened and in walked a young man. He closed the door quickly behind him. He was nice-looking, blond, dressed in casuals, thick-soled shoes and rope tie.

"My name is Wilson," he said, "and I want to hire you."

I lowered my feet and the bottle, spilled a package of cigarettes across the desk and motioned him to the visitors' chair.

"Fine," I said. "I need a retainer of fifty bucks. Black-mail or divorce?"

He placed some money on the desk and I admired the crispness and design of it. It was a hot day. I had the window open and the blind down, and traffic sounds

floated up to my office on the fifth floor.

"I want you to find out why a man named Lazarus is giving me money," he said.

My thoughts stopped wandering. "Say that again!"

"Lazarus has given me fifteen thousand dollars to continue my research into psi faculties. I want to know why."

I released the blind so that it ran up and let the sunlight pour over his face. He blinked, but that was all.

"In my job," I said, "I hear some crazy things—but you *look* okay."

"I'm as sane as the next man," he admitted, "but curious."

I lit a cigarette and regarded him with steady concentration.

"Suppose you start from the beginning, Mr. Wilson..."

"Dr. Rhine of the Duke University isn't the only one interested in psi research," Wilson said. "I've been working at it myself, quite independently, for the last three years—and I've been aiming to take the whole business a step further. What I'm after is a practical application of psi."

He paused, with an expression on his face that showed he expected me to be impressed. So I nodded.

"Three years," he repeated. "I was just beginning to get somewhere when my money ran out. It looked like I'd have to throw in my hand and find a job. Then I was tipped off about Lazarus—he might help if I showed him the results of my work."

"Who tipped you off?" I asked.

"A friend of mine, Charlie Miller. He's been researching into hypnosis. Lazarus helped him with money when he needed it, so I wrote to

Lazarus, enclosing my results and projected programme. I received fifteen thousand by return of post and no strings attached."

"I'm in the wrong racket," I said. "I'd sure like to meet this Lazarus."

"So would I," Wilson said, staring me out.

"Mystery man, huh?"

Wilson nodded. "He has an office on Wall Street. I went along there to express my thanks in person. I didn't get to see Lazarus—the man I saw called himself Tracey. He was small and old, cagey as hell—told me Lazarus never met anybody, that all communications went through him."

Wilson pulled a sheet of paper from his pocket and passed it across the desk. "I did some digging on my own account," he said. "This is a list of people, and the work they were engaged upon, who have received money from Lazarus."

I read down the list:

Gordon—clairvoyance

Davis — Gestalt psychology

Zimmerman—author of *The African Medicine Man*

Hillier—psychomatics

Glinke—automatic writing

Dewer—author of *A New Valuation of the Spirit World*.

Wilson said: "I don't suppose the list is exhaustive. The interesting point is that all of us have been engaged upon work into what I might call, 'the science of the mind'."

"Yeah, you might call it that," I told him. "This Lazarus has a bug about it and the money to indulge his whim. Rich guys are like that. It's legal—there's nothing to investigate. Why not pocket the dough and forget him?"

"I have a hunch there's more to it than that. Lazarus is encouraging research into the one field orthodox science has ignored, the field of human personality. Make no

mistake about this, Mr. Stone, if we succeed in finding natural laws behind the minds of men, and applying those laws, then we've got something really big . . . bigger than nuclear physics, for instance."

"Okay," I said. "I'll look into it if that will make you happy."

After Wilson had left, I took the elevator down to street level, collected my auto and drove north to my apartment. The sun was blinding hot, there wasn't a breath of air stirring. I showered and changed into a dry shirt, ate at a drug store and drove towards Wall Street.

Tracey's office was small; just a desk, two chairs and a phone. Like Wilson said, he was small and old; retired lawyer would be my guess at his occupation.

I said: "I'd like to fix an appointment with Mr. Lazarus."

Tracey didn't bat an eyelid.

"I regret that is impossible," he said drily. "Mr. Lazarus sees no one. If you will state

your business, I will see that Mr. Lazarus is informed."

He waited me out.

"I'm working on a new theory of telepathy," I lied. "I need money to continue my research."

"Mr. Lazarus will be glad to help you. All you need do is prepare a synopsis of your theory and send it to this office. I will transmit it to Mr. Lazarus and he will make a grant depending on his valuation of your ideas."

I seated myself on a corner of Tracey's desk and lit a cigarette.

"Look," I said, "all I want is to get to see your boss. Why the mystery?"

"Mr. Lazarus sees no one," he repeated.

"Yeah, you said that. Now tell me what he looks like—you must have seen him."

Tracey shook his head.

"I have never met Mr. Lazarus. All my business with him is done by mail."

I looked close at him. He wasn't lying.

"Okay," I said, "I'll write—maybe."

I dropped my private card on his desk and walked out, thinking Lazarus wouldn't want to pass up a chance to hand out dough. I was playing hard to get.

I checked with Charlie Miller and Dewer, the only two on Wilson's list who lived in New York. I learnt nothing. I tapped Tracey's phone, but the only calls he got were from people needing money. Tracey never once called Lazarus.

I checked on Tracey, too. He had a comfortable house and a bank account; he moved from his house to the office and back again. I tired of watching him.

Wilson called again and paid another fifty bucks to keep the investigation open. I had one divorce case and Tracey wrote reminding me to send in a synopsis of my theory; Mr. Lazarus would be encouraging, he hinted.

It seemed the only thing to do was tamper with the

U.S. mail. Accordingly, I waited one morning for the collection and passed the mailman five bucks. Sure enough, Lazarus had an address out of town and I drove out.

The countryside was a pleasant shade of green, the air clean and the highway practically deserted. I passed some pretty large houses set in county-sized grounds, walled off from the casual eye. If Lazarus lived in this style, the man I was dealing with was another Rockefeller.

Presently, I was all alone in the world, just me and the winding road and miles and miles of high, glass-topped wall. The house was set on a hill with a view commanding all approaches, and it became obvious I wasn't going to sneak up unobserved.

I reached the main gate and pulled up. There was a lodge beyond the gate, and a man came out to look me over.

"Open up," I said breezily. "Mr. Lazarus sent for me in a hurry."

He looked at me steadily, like a man memorising a face.

"You want something, Bud?" he said.

"Yeah, I want to see Lazarus."

"Beat it," he said. "Skip. Take the air." He returned to the lodge and left me the wrong side of a solid iron gate that might not have been opened for years.

I turned the car and drove back towards the city. I didn't go far, just far enough to pass out of view from the house. I parked under some trees and lit a cigarette and waited for darkness.

The sun set, the sky clouded, and the moon wouldn't rise for a couple of hours. I headed back on foot, carrying a rug from the car. When I reached the wall, I threw the rug so that it settled across the jagged glass. I took a short run and jumped.

Inside the wall, I moved quietly, heading by instinct for the house on the hill. I didn't hear anything, but a heavy body knocked me flat.

Sharp teeth nuzzled my throat and a fierce growling did something scary to the pit of my stomach. The beam of a flashlight hit me between the eyes.

"Let him go, Buster," said a familiar voice.

A hundredweight of mastiff rose up and I started to breathe again.

"Friendly sort of animal," I said in my best conversational manner.

"He won't hurt you unless I tell him to," said the hard-faced guard I had met earlier. "Just walk ahead of me." He held a .45 automatic in his hand.

Buster followed at my heels.

We reached the lodge by the main gate and a man waited for me. He was slim, neatly dressed, a man of superior intelligence to my guard.

"Mr. Lazarus?" I asked hopefully.

He shook his head. Fingers worked deftly through my pockets and discovered my licence.

"Who are you working for, Mr. Stone?"

"My grandmother," I said. "She's a hundred and nine and has to support her widowed father."

The slim man was not amused. He sighed, like a summer breeze over water.

"You're outside your territory," he pointed out, "and Mr. Lazarus is generous with his donations to the police orphans' fund."

He didn't need to read *me* the score. The county cops wouldn't like me.

"Don't come back," he said.

My guard walked me outside, unlocked the gate and turned me loose. Buster took a last hungry look as I walked away.

Two days later, I received a cheque for ten thousand dollars. I tore it up and mailed the pieces back to Tracey, then I went to see Wilson. He listened to my report with a troubled air.

"I don't like it," he said. "If we really discover a set

of natural laws behind psi phenomena, it could be the biggest thing in the history of our race—and the biggest menace, in the wrong hands. Isn't there any way you can get into that house?"

I assured him there was.

Clint Stevens and I had served through Korea together. He'd do what I asked, and without questions. More important, he ran a small commercial airline and owned a helicopter.

It was a cloudy night with the moon showing faintly when I dangled at the end of a rope ladder. Below my feet, the roof of the house angled away. I hit a chimney stack, let go, and rolled to the edge of the parapet. Clint took the heli up and away and I was on my own.

I found a rain-pipe that led close to a window, and the window wasn't barred. I used a jemmy to force the latch and climbed in. The room was empty. I padded across to the door and listened,

opened it, moved into a long corridor.

I had a flashlamp in one hand and a revolver in the other. This time I wasn't going to be stopped. The top floor was empty, with thick dust, so I moved down to the next floor. Nothing there, either. A light showed from a room on the ground floor and I crept towards it.

The slim man sat at a desk, writing. He looked up as I entered.

"I told Mr. Lazarus to expect you," he said easily. "You shouldn't have sent back the cheque, Mr. Stone."

"I'm an honest man——"

I marched into the room with my revolver pointing at him. I didn't march far. Inside, there was a man either side of the door, big men. Without speaking, they each took one of my arms and lifted. My feet rose in the air and my gun hit the carpet.

Suspended, helpless, I watched the slim man rise from his seat. He opened a

drawer of his desk and pulled out a hypodermic.

"This won't hurt," he assured me. "Just a little something to put you to sleep."

I felt the prick and the curious pounding sensation of a liquid penetrating my veins. I felt heavy as lead and the room rippled in waves as seen through water. It got darker and darker and my last conscious thought was one of fear.

I woke to utter blackness in a room whose air was humid. I felt light-headed, relaxed. The room was small and the walls metal-hard to the touch. There didn't seem to be a door or any windows.

I hammered on part of the wall and let out a yell to indicate I was back in circulation.

A voice spoke, a voice with an oddly mechanical accent.

"I am Lazarus. You will not be harmed, Mr. Stone, but certain precautions must be taken. You are being moved to a place of safety."

"New York suited me fine," I assured him.

"You will not see New York again."

"Kidnapping is a Federal offence. At least two people know I visited your house."

"Your disappearance will be accounted for, Mr. Stone. It is not the first time I have had to resort to such means to hide my activities."

"What's your game?" I challenged.

The answer never came, and after a time I tired of being ignored and started again to hammer on the walls. I kicked up a hell of a racket.

Lazarus spoke: "Please stop wasting your energy."

"Then show yourself," I demanded.

After a pause, that strange voice said: "I am all about you, Mr. Stone."

I didn't like the implication behind that, and snarled: "Who are you kidding? I'm out of the nursery . . ."

"Are you? Are any of your race?"

"My race!" I licked ner-

vously at lips suddenly dry.
 "What the hell are *you*?"

There was no answer. The silence went on and on, and my thoughts did nothing to fill it.

"Lazarus," I whispered, "are you trying to tell me you're not human?"

Again I received no reply.

"What's all this about psi faculties?"

The darkness, the silence, was shredding my nerves. I began to shout.

"Damn you, answer me!"

Lazarus said: "You must wait till you arrive where you are going."

"Where's that?"

"A long way." There was a pause, then: "Have you never looked at the stars, Mr. Stone, and wondered whether the planets revolving about them are inhabited?"

"Sure," I said. "Where does that get us?"

He didn't answer and the long silence was back. I never met anyone so reluctant to talk as Lazarus. I began to kick the walls again; that

seemed the one thing I could do to annoy him.

"Suppose, Mr. Stone, that the inhabitants of these other worlds are more advanced than your own race. Suppose that when you develop certain latent faculties you achieve maturity."

"All right—suppose it," I prompted.

But that was the end of another conversation. I tried to fit the pieces together . . . the human race had to rise by its own effort . . . the most Lazarus could do was remove material barriers.

He spoke then, as if aware of my thoughts.

"I am going to raise another barrier . . ."

I heard a metallic click. Then there was blinding light from outside, and a black void studded with stars. The moon seemed very much larger—only it wasn't the moon. It was blue-green in colour and I clearly recognised the contours of the American continent.

You can learn an awful lot at a

Post Mortem

by

ROBERT PRESSLIE

DUFFY ITCHED. IT WAS NO comfort to know that the great hall was icy cold; these places always were. He was hot and he itched, and he couldn't scratch. He wished it was time for Gillick to relieve him.

Earlier in the evening the hall had been crowded and the time had flown. He had felt pretty important standing guard over the catafalque. It had been interesting to sort out the different types: the sensation-seeking ghouls, the hero-worshipping kids who didn't know the corpse on the catafalque had been a louse, the dolled-up chicks taking time off from the dance parlours to get a dubious thrill out of ogling a dead shrimp of a man old enough to be their father. The chicks had been the best fun, giggling and squealing when Duffy winked at them through his faceplate.

But the mob had thinned out. Only fifty or so remained, filing slowly and silently through the frigid gloom. Duffy was bored with them. He guessed these were the real mourners; nobody else would have left it so late. He would have liked to tell them that they were wasting their tears and their sympathy on Forde. Yet, irrespective of what Forde had been, loyalty to the Corps stilled his tongue, and instead of pitying the mourners for their misplaced grief, he envied them because at least they felt the chill air of the hall and didn't itch as he did.

He envied Forde a little, too. The dead captain was in a spacesuit like himself. But the captain wasn't sweaty and itching. He cursed the admin officer who had dreamed up the idea of Forde's crew standing guard in full space rig. He sneaked a glance at

the chrono on his belt and got a little satisfaction when he noted that he was in the last hour of his watch.

He looked up into a pair of steely eyes set beneath a cap with the familiar skyblue-and-silver braid. Automatically he stiffened to attention and flicked on his chest mike.

"Sir!" he acknowledged.

The commodore's return salute was sloppy, as if his very arm was heavy with sadness. He read Duffy's tapes and said: "Reactor man, eh? With Captain Forde long?"

"Five years, sir. Three complete round flights between the Wheel and Mars."

"Wonderful man, Captain Forde. Seventeen years in the service—seventeen years, mark you! And only once home to Earth in all that time. Did you know that?"

Duffy knew all about Forde's fanatical devotion to the service. The entire crew knew and failed to understand it. They suspected their captain of trying to set up some vain record, of a secret crime committed on Earth years ago, of madness even. Insanity was the favourite verdict. Any man who actually preferred to spend his leaves at one or other end of the

ferry instead of on terra firma was mad. Any man so stubbornly intent on never homing on Earth again, even to save the life of the youngest member of his crew, deserved to be lying where he was now.

"And to think," the commodore was saying. "To think that he barely made the grade medically. I was on the selection board when he was admitted to the service. It was touch and go whether he got in, you know. Yet he justified our decision, overcame his physical deficiencies and became the best of them all."

Duffy grunted something appropriate and hoped the commodore wasn't going to keep up the biography much longer.

But the commodore wasn't finished yet. "Took off on his first flight when he was ill. Defied us! Fearful blisters, he had, but he said it was only nettlerash; locked himself in the ship and refused to come out. It was rockets at that time, of course, and everything was primed. Nothing we could do but let him blast off. Damn his magnificent soul! Remember him, my boy. You'll never serve under anyone like him."

For which I'll be everlastingly grateful, Duffy said to himself. Nettlerash! Probably suit-scab, like I'll be having myself if I don't get out of this rig pretty soon. He relaxed as the commodore moved on and the queue started crawling again. A crane of the neck assured him that there were no more uniforms in the hall. He'd had enough for one day of hearing all Forde's virtues paraded.

He thought it funny how those same virtues of the captain's were the very qualities which the crew hated most. His insistence on punctuality and adherence to regulations. His unnatural revulsion for Earth. His lack of sympathy for anyone in the slightest way ill; according to the commodore he hadn't been a hundred per cent fit himself—but was his own stoicism any reason for expecting everyone else to be a martyr? Take young Kenwood—if the crew hadn't intervened the kid would have died.

The ship was two days out from the Wheel, returning to the space station with a load of natural, high-refractive Martian glass, when Kenwood passed out for the first time. He was green as the cargo

and sweating cold water when they found him draped over the chart screens. Like the rest of the crew, the kid hadn't been home for a year. It was his maiden trip and nobody thought very much of the incident. All of them had sickened for home, really sickened, at least once. There wasn't any argument when Forde ordered a sedative for Kenwood and passed the incident off without further comment.

Kenwood was sick again an hour later. And every hour after that. Forde said he was to be put on a diet of pills and no food. But when he had nothing to vomit the navigator was still sick. The bouts came with increasing frequency, the green pallor persisted and he was huddling in his bunk with his legs drawn up, moaning all the time about a pain in his stomach—low down on the right side.

The crew had it tagged as appendicitis right off. As yet there were no hard feelings towards the captain—no more than usual, that is—for he was doing his job, getting the ship back to the Wheel as fast as possible. Twelve hours out, he put through a regulation call for medical stand-by.

Half an hour later the reply came back. The station doctor was dead. He had succumbed to tachycardia, the space-man's occupational disease; working under a subnormal gravity his heart had raced and raced until, finally, it had jumped its bearings.

Then the trouble started. The crew wanted the ship taken straight to Earth where Kenwood could have attention. The kid looked as if peritonitis was swelling his blood with bacterial bilge. Forde refused to bypass the station. Regulations said the ship was a ferry plying between the station and Mars. There was nothing in the books which said she could land on Earth. Furthermore, if they went to the station as ordained, there would be a relief coming out and due to arrive next day.

Next day could be one day too late, said the crew. It was Earth or nothing. Either the captain—

Duffy's reminiscences were cut short. One of the mourners, a woman in black, was lying against the catafalque, sobbing hysterically. Slightly embarrassed, for he wasn't very old, Duffy moved round the dais and put his gloves on her arms. She stiffened at his

touch, straightened and recoiled when she saw the uniform.

"Take your hands off me," she said with venom. "You're, you're another of them." To Duffy's dismay, she cried again, but there was laughter among the tears and he felt uneasy.

She looked at the corpse. "Captain Forde!" she sneered.

"He was a great man," Duffy echoed the commodore—without any great conviction.

"He was a rat," the woman countered. "A selfish, inconsiderate rat. A fine husband he turned out to be. Husband! Seventeen years married and I saw him once. That was fifteen years ago. Seventeen years married—no, wasted. My life wasted. And what for?" Her shoulders drooped, her arms swung loosely at her sides. She shrugged and answered herself. "Nothing. No husband. No pension. Nothing."

Duffy felt obliged to speak. "Have you been to the office?" he tried. "They should be able to arrange something."

"Office? Catch me going there! They don't like me. Know why? Because I drink. Every month when I collect

my allocation I'm drunk and they don't like it. Anybody else can be drunk, but not Captain Forde's wife. That's letting him down. I know what they're thinking, all right. And whose fault is it I drink? His!"

The captain's widow shuffled off. She seemed to realise suddenly that she had said too much. Duffy wasn't sorry to see her go. He sighed relief.

The tail of the queue was all that remained, and Gillick would relieve him in fifteen minutes. He didn't envy the radar man the night watch. Gillick would have to stand guard alone. There would be no crowd to speed the hours. There would only be Gillick and the captain—and he wasn't pleasant company, never had been.

Forde had been strong on solitude. Always a strict disciplinarian, with himself as much as with anyone, he had never unbent to speak with any of the men on level terms. Throughout each transit he confined himself in the flight room, and his voice issuing over the Tannoys was the only indication that he was aboard and alive. Heaven help anyone who entered the flight room without permission.

Duffy could remember the time he had committed the unforgivable sin. In that instance he had roused the captain's ire doubly by leaving the door open behind him. But the lambasting he got then was nothing to the humiliating flaying which Mahon, the biologist, suffered when he marched into Forde's den uninvited, with both the flight room door and the door of the hydroponics room gaping behind him. It was made very clear that the captain didn't care much for the wet smell of greenery.

There wasn't a man aboard who hadn't suffered the lash of the captain's tongue at one time or another. Which may have accounted for the pleasure which the crew took in standing their ground over the issue of young Kenwood. Either the kid was taken straight to Earth, they said, or they went on strike. Gillick refused to take bearings on the Wheel. Mahon refused to renew the nutrient in the hydroponics tanks. The charts were locked up by the deputy navigator. Duffy and the other reactor men threatened to pull the rods.

"Fools," said Forde. "Why don't they send me men for my crew instead of callow

youths who yearn so much for home that they can't think straight? Get back to your posts at once. You'll achieve nothing by mutiny. Kenwood must take his chance. A few hours won't make that much difference."

There was some truth in Forde's accusation. Every man in the crew was fed up of space. They wanted to see home again. Let the captain do what he liked with his record number of flights—they wanted their feet on Earth for a while. Kenwood's illness had come conveniently. But at the time they refused to see it like that. The kid was dying and the captain was a cold-hearted love-child, prepared to murder the navigator for his principles.

With their own new-found principle, the crew stuck to their resolve. And they won their point. Without the charts and radar, the captain couldn't hope to find the Wheel. There was nothing he could do but capitulate and head for Earth.

From the minute he fired the torque jets, Forde was a changed man. He grew older hour by hour. His fire and self-reliance drained out of him. He asked for things to be done instead of ordering.

His reluctance to see Earth again became more and more a pathological phobia, manifesting itself by reducing him to a worried, uncertain old man.

Somewhere near the point-of-no-return he made a final plea. "Give me directions for the Wheel and I'll overlook your actions," he asked.

The crew's reply was terse, rude and in the negative.

"But the spare oxygen tanks are empty," Forde said. "They can't be recharged between here and Earth. How can we wear suits without oxygen?"

To this the crewmen merely looked at each other and tapped their heads meaningly. And that was the last time Duffy had heard Forde speak. When they had touched down the captain had personally escorted Kenwood to the spacefield hospital. As far as Duffy knew, Kenwood was still there, but Forde had come out the same afternoon—feet first.

His eyes crawled over the captain's corpse. There was no emotion in his gaze. Forde hadn't been a man to evoke pity or sorrow for his passing; and if he had been a louse, he was a dead louse now and no longer worth

hating. Duffy just wondered how the captain had succeeded in hiding his baseness so long. If the people who had filed past the catafalque all day had only known——

Then Duffy noticed the queue had gone. The quietness was complete with the absence of shuffling feet and muted voices. One solitary mourner remained at the catafalque, a young man, a fuzz-chinned youth who ground one white-knuckled fist into the palm of his other hand and didn't care who saw the tears on his cheeks.

It was the black suit and the lack of uniform that fooled Duffy. He took a full minute to recognise the kid.

"Kenwood," he said. The second syllable was higher than the first.

"Duffy," the navigator acknowledged. At first he didn't turn his head, then he looked at Duffy's faceplate and said: "God, we were wrong!"

The lowest form of life in space is a reactor man. But anyone who can make even that grade, anyone who can qualify to put a nickel-soled boot through a spaceship's port, is no moron—not by a long way. Duffy didn't have to strain himself to arrive at

the reason for Kenwood's presence and his vehement condemnation.

"There was nothing wrong with you?" he said. "It wasn't appendicitis?"

Kenwood shook his head and looked utterly miserable. "Too much space, not enough guts, that's all. The captain was right, and I killed him."

Duffy could see the kid needed stiffening. "You didn't force him to make for Earth. The rest of us did that. You were too sick."

"Nerves. A shot of amphetobarbitone and a couple of hours on the trick-cyclist's couch put *me* on my feet again. But nothing can bring *him* back to life."

"Out there," said Duffy, "you were a dying man—in our estimation. So maybe we were wrong. But Forde had no right to deny you the chance of proper medical attention. He was a regulation-bound skunk."

Kenwood's baby face creased. "But he wasn't," he said earnestly. "He may have been stiff about most things, I agree. But stubbornness had nothing to do with his refusal to bypass the Wheel. He knew that to land on Earth meant his own suicide."

Duffy's chin dropped till it hung in the pool of sweat in his head bowl.

"Hay fever killed him," said Kenwood. "Long ago he had nettlerash. It was never properly treated. He was left with a legacy of too much histamine in his blood. He was allergic to plants in any form. He drowned in his own body fluid."

Duffy remembered the time Mahon had omitted to close the door of the hydroponics chamber.

Kenwood continued: "You can guess why he never left space in fifteen years. He went home once, two years after he was married. He nearly died then. It wasn't that he didn't want to see Earth. He must have broken his heart every time he thought about home. But he also knew that home meant death."

"Poor devil," grunted Duffy. Then, as it occurred to him: "Why didn't he tell his wife or somebody?"

"He had his pride for one thing. More important, he had his pension to think about. Space was his only trade. He was afraid of being turfed out of the service as a crock. He was doomed to be a new

Flying Dutchman, and he was determined to make the most of his misfortune."

"He could have had treatment and gone back to the service," Duffy suggested.

"You know the service pension accumulates. You can make yourself rich in space—but only if your record is unbroken. Life upstairs isn't very attractive. The money is."

"Sure," agreed Duffy. "It's like in the quiz programmes. Double or nothing. The old incentive racket. Sign for another period and get double pension. Quit and you get a pittance."

Kenwood nodded. "The captain was due for the maximum in three more years. He would have quit then, when his wife was provided for. He would have been prepared to die quite happily for that price."

Duffy saw Gillick approaching to relieve him. He snapped to attention, took three regulation paces and a right turn to the foot of the coffin. Ignoring the amazement in Gillick's eyes, he saluted the corpse. It was a salute that Forde himself couldn't have bettered.

Everyone has to make—

The Long Journey

By ALAN INNES

STANLEY WAS SITTING IN the rec-room drinking his third cup of coffee when Hemridge appeared with the collated data on the planetary system.

"A bonanza," said the astrogator sourly. "Three planets; one too far out, one too far in, the third barely possible." He took the cup which Leman, the engineer, handed to him. "Not much to find after twenty-three weeks of travel."

"Saves work," said Leman. "The less we have to look at the sooner we'll be home."

"The more we find the bigger the bonus," corrected Klien. The geologist smiled towards Thorne. "Right, doc?"

Thorne didn't answer. Instead he moved to where he could read the instrument findings over the captain's shoulder. "How does it look, Cap?"

"Depends on what you're looking for." Stanley frowned at the data sheets. "Mean temperatures approximately ninety-five degrees Fahrenheit. No ice caps, no oceans, plenty of desert and what at one time must have been mountains. No large areas of vegetation." He glanced towards the astrogator. "We must have emerged pretty close for you to have got all this so soon."

"Pretty close," admitted Hemridge. "We were lucky." He didn't say how and they didn't need to ask. Sometimes a ship would emerge from hyper-space at the same coordinates as a planet or a sun. Nothing more was ever heard from either ship or crew. The penalty of trying to force two objects to occupy the same space at the same time was always devastating.

"Well, what's the procedure?" Leman hunched

closer. "Do we orbit and photograph, or land and explore? How much time have we got, Cap?"

"Not too much. We had a long trip out and we've got just as long a trip back. If we want to keep eating we'll have to watch the stores." Stanley pushed away the data sheets and relaxed in his chair. "As against that we've only the one planet to look at. What do you suggest, Thorne?"

"Orbit," said the doctor quickly. "Normal procedure. We can take our time and use the scanners to get really good pictures. We can even send down trace-bombs so as to get accurate spectrographs of the air and soil. There's no real need for us to land at all."

"I don't agree with that," said Klien impatiently. "Hell, what have we got to be afraid of? With the emergency arms we could beat off any attack. If there's intelligent life down there we want to know about it, and if there isn't then why stay up here, anyway?"

"Let us remind you that this is an exploratory vessel," said Stanley quietly. "Our

job is to find Earth-type p'anets suitable for later colonisation. We do *not* have to land to do that. As long as a world has breathable air, drinkable water, a livable climate and a bearable gravity, then we can mark it down as suitable. That's all we're supposed to do. You know why that is."

"That old bogey?" Leman didn't sneer, but it sounded as though he wanted to. "I thought that one had been written off long ago. But never mind that, what about us? We've been cooped up in this tin can for six months now and it'll be at least as long before we get back. I'd like the chance to stretch my legs for a change." He looked hopefully at the captain. "We can take precautions, sure, but we're not children. We know what we're doing."

"Hemridge?"

"I agree with Leman," said the astrogator. "I'd like to land, too."

"They're crazy," said the doctor furiously. "Damn it, Stanley, they know as well as I do why we shouldn't land.

That's up to the colonists, not us. We're not expendable."

Thorne was right, of course, and Stanley knew it. He sighed as he straightened in his chair.

"We'll orbit and photograph," he said firmly. "Normal procedure."

He busied himself with the data sheets to avoid seeing their expressions.

Photographs showed a world which, as worlds went, was no prize. Gravity was slightly greater than that of Earth, the oxygen content lower, the water far more scarce. As a world for future colonisation it was admissible only on the lowest level, a world of deserts, scanty vegetation, few natural resources. A world which had long since passed its prime and was now on the way to planetary death.

But the photographs showed more than that.

"Civilisation!" Leman stared up from the still-damp prints. "Look! Civilisation!"

"Where?" Klien shouldered his way to the table. "Cities? Impossible!"

"Look for yourself then." Leman passed over the print and grabbed another. "See? That depression there, and that long, too straight line. Nature never made that. There's intelligent life on this world or," he corrected himself, "there was. Boys! We've hit the jackpot!"

"Take it easy!" Hemridge reflected the contagious enthusiasm of men who, all their lives, had searched for another thinking, building race of beings and, as yet, had never found one. "Let's be certain. Where are the rest of the prints?"

"Here." Leman thrust them forward. "What say, Hemridge? Am I right?"

"How do I know?" Hemridge looked up as Stanley, accompanied by Thorne, entered the rec-room. Being the largest room in the vessel it was used for anything requiring plenty of space, from impromptu wrestling matches to assembling ariel photographs for marking and code-reduction. "Hey, Cap! You've been working on these prints. Is Leman right? Are there signs of buildings?"

"Perhaps," admitted Stanley cautiously, "but we can't be certain." He gestured for the others to clear the floor and began setting out the prints. "These were taken over the north polar area. Using infra-red film we discovered markings unnoticed with the normal film, and it does seem that certain markings are due more to artificial construction than to natural means." He selected more photographs. "These are enlargements of the same area. Notice the roughly circular patch of what appears to be an artificial structure." His fingers tapped the glossy surface of the print. "And see? Those radiating lines fading towards the circumference of the globe. In a way, the markings are similar to those found on Mars, the canali." He shrugged. "Those were found to be natural fissures caused by the contraction of the upper crust."

"Those aren't natural," stated Klien positively, and now he was all scientist. "They aren't open fissures, there's no erosion, and there doesn't seem to be the slightest deviation from the straight

line." He stared at the prints. "They remind me of tunnels," he said slowly. "Subterranean tunnels, originally buried deep beneath the surface and now partly exposed. There must be a temperature-difference for them to have shown so clearly on the infra-red."

"But the size," protested Hemridge. "Don't forget the scale of those photographs. Who would build tunnels so big?"

"And that building," murmured Klien. "It's titanic!"

"Any race which could build that big must be far in advance of our own." Leman seemed shaken by the discovery. "This thing is *big*! I wonder what else they built?"

"The planet is old," reminded Klien. "Not as old as Mars, but far older than Earth. It is logical to suppose that a civilisation could have risen, built, then vanished. We have an analogy in the Pyramids of Egypt and Mexico." He stared thoughtfully at the photographs. "I wonder what happened to them?"

"Why assume that they aren't still there?" said Leman.

"Admittedly, they could be decadent, but there is no reason to suppose that they have just vanished. That world is still capable of supporting life."

"Our life," said Thorne dryly. "Theirs?"

"Why not? They could have adapted, couldn't they?"

"So could the dinosaurs—but they didn't."

"Dinosaurs didn't build," snapped Leman peevishly. "These people did, and anyone with intelligence to build like that could have moulded their environment to suit themselves."

"Perhaps." Stanley sounded very patient. "We still aren't certain that these markings are signs of artificial structures or that there ever was an intelligent race here. As scientists, you should know better than to argue on the basis of unsubstantiated assumptions." He hesitated. "Anyway, we're not equipped for a proper investigation. Later expeditions can bring excavating machines, labour, experts..."

"We're landing," inter-

rupted Leman, and the way he said it made it a statement and not a question.

"We're not landing," said Thorne flatly.

Stanley sighed.

It was an old problem renewed each time they surveyed a new world. Instinct and emotion said to land, to see and touch and feel. To breathe fresh air instead of tasteless gases, to walk on solid ground, to feel real dirt and to smell the scent of growing things. Logic said to orbit, to stay above the atmosphere; to remain sterile and safe from any contamination. Cold reason said the same, but whenever has cold reason been stronger than emotion?

"If we land," said Stanley slowly, "we'll be taking a risk. You know that we can't safeguard ourselves properly, and if there's a disease down there we're going to get it." He paused. "On the other hand we're going to be in six-month quarantine on the journey back to Earth." He looked at them. "I leave it to you. It's your necks you're

risking. If you want to take the risk, we land."

They did.

They landed close to the edge of the main area at the pole and immediately everyone set to work. Stanley, despite his initial hesitation, became fired with the same enthusiasm as the others.

"They were big," said Klien one night as they sat relaxed in the rec-room. "At least fifty feet tall if the size of the chambers and connecting tunnels are anything to go by."

"They were engineers, too." Leman spoke with regretful envy. "I'd like to know how they managed to build so big and yet dispense with internal stanchions. It almost seems as if the entire structure was made in one piece."

"And they, themselves?" Thorne, sitting in his chair, was the only one unaffected by the general interest. "Did they build so well in order to vanish?"

"How do we know?" Klien made no attempt to hide his irritation. "Those ruins are old, can't you understand

that? At a guess I'd say at least half a million years old, and maybe twice that. The hardest skeleton would have crumpled to powder in that time. We don't expect to find signs of the builders themselves, only what they left behind." He shrugged. "Maybe we'll find a carving or fresco or something like that, but I doubt it. Advanced races seldom use their own image to decorate their structures. They use symbolism, abstracts, mathematical lines and curves if they use anything at all." He looked towards Hemridge. "Have you analysed that metal yet?"

"No." Hemridge sounded upset. "The spectroscopic pattern is unfamiliar to me. I can recognise the elements, but the alloy is something new." He looked baffled. "It's not all that strong either, more like a honeycomb than a solid piece, and it fused almost to nothing at a pretty low heat. Get me some more, will you?"

"Sure." Klien dismissed the problem. "What I can't understand is, what happened to the upper structure?"

"Was there one?" said Stanley. "We build upwards, but would other races necessarily do the same? Perhaps the building had a thin shell of rock and soil which has eroded over the years. Maybe that explains the metal they used, weak but with high strength for lightness. Those walls are incredibly thick, the building itself resembles a sponge more than anything we know, and they could have built downwards for increased strength."

"Or perhaps the upper detritus is merely the accumulation of the centuries," said Hemridge thoughtfully. He looked at Klien. "Any idea of what they must have looked like?"

"Big, as I said, and my guess is that they were multiple-limbed. No stairs," he explained, "just ramps and inclines. Stairs are peculiar to bipeds; if you've ever watched a dog climb stairs you'll know why."

"Anything else?"

"No corners. No flat surfaces, either. And yet they must have machine-finished

the interiors. That metal is smooth."

"Machined?" Stanley frowned. "Without any flat surfaces?"

"It could make sense," defended Leman. "Just because we find plane surfaces aesthetically satisfying doesn't make it universal. Maybe they liked curves." He grinned. "Speaking of curves, how about setting up the viewer and getting an eyeful of some real ones?"

"Later. How are you going on with the mineral analysis, Klien?"

"The planetary one?" The geologist shrugged. "As I suspected. The place seems pretty low on minerals. All the sand around the structure is devoid of the slightest traces. There should be plenty deep down though; the detectors kick like hell whenever I point them towards the core."

"Fair enough. This won't ever be a colonists' world, anyway. The scientist will grab it for investigation of the ruins and set up a project here." Stanley looked wistful. "I'd like to stay and see the

end of it, but I don't suppose that I'll live that long. We'll have to be leaving soon, anyway."

"Leaving?" Hemridge sounded shocked. "We can't leave."

"We have to leave some time," reminded Stanley. "We just can't immolate an exploratory vessel here indefinitely. The quicker we get back and report this discovery the sooner a properly equipped expedition can come out to investigate. After all, this isn't our job. We just aren't geared to handle it." He grinned at their expressions. "Sorry and all that, but it can't be helped. You've got five more days, so tidy up and make the most of it." He nodded to Leman. "Now, how about those real curves?"

He grinned again as the viewer flashed the tape on the screen. Nothing like a touch of home to remind them of what they were missing—and to make them eager to get back to it.

Blast off was on schedule. Ten diameters from the planet

Stanley yielded control to Hemridge who, as the rocket drive vibrated into silence, busied himself with his instruments as he sighted on the target stars which would guide them to Sol. Finally, after careful alignment, he made the thumbs-up gesture and Stanley hit the field-switch. A moment of strain, a subtle twisting, then the shrilling sub-sonics and the swirling rainbow pattern on the screens told of their entry into hyper-space.

They were on their way home.

Once on course, there was nothing to do but sit and talk and while away the time. Naturally, the talk was all of the Great Discovery, and the air of the rec-room hummed with conversation.

"We need ten years, a complete excavation set-up, and plenty of labour," said Klien. "I'm going to request a transfer to the project as soon as we get back home. You joining me, Leman?"

"Sure. I'd like to find out just what happened to them."

"War, perhaps?" Hemridge spoke without any real inter-

est. He sat, half-slumped in his chair, his face glistening with perspiration. "Maybe they wiped themselves out as we almost did a time or two."

"I don't think so," objected Stanley. "War means ruin, and that structure wasn't ruined, not as we understand the term. Deserted, yes, but not destroyed. It's a pity that we couldn't find any artifacts."

Klien shrugged. "It's a big planet, and an old one. We've hardly touched the surface, and from what I could see that city went way down deep. There could be storehouses and workshops in the lower levels. New technologies, museums, libraries, anything." He smiled as he thought about it. "This is the biggest thing anyone has ever found."

"And that makes it good?" Thorne's voice was heavy with cynicism. "Just because it's big it's good, is that it?"

"I'm serious, Thorne. This discovery means . . ." Klien made a gesture. "I can't tell you all it means. For one thing we're no longer alone. Intelligence isn't a freak which has only happened on the one planet. It may even mean that,

sometime, somewhere, we are going to meet another race of thinking entities."

"God help them if we ever do," said Thorne bitterly. "If our own history is anything to go by, they'd be better off dead."

"You're a cynic," accused Leman. "Why don't you admit that it's possible for a race to grow up? We've made our mistakes, I'm not denying it, but that's all over and done with now. Anyway," he grinned, "if it hadn't been for the cut-throat persecution back in the old days, there wouldn't have been any pressure to force men into space. Men have suffered, sure, but mankind has benefited in the long run. What do you think, Hemridge?"

"You could be right," said the astrogator carelessly. "I was never good at ancient history." He yawned. "I'm all in. Guess I'll get to bed and catch up on my sleep." He heaved himself to his feet and stood, swaying a little and blinking his eyes. "Continue the argument tomorrow when I'm active."

"We'll save it for you,"

said Leman. "It'll keep. That's one argument guaranteed to last forever." He smiled at Thorne as the astrogator left the room. "Don't let Hemridge fool you when he says that he doesn't know history. I've heard him argue two professors to a standstill, and he can draw you a cyclic chart to prove any point he wishes. We should have fun tomorrow."

But in the morning Hemridge was dead.

He lay on his bunk, one arm outflung, his knees drawn up a little, and his face was peaceful as though he had died in his sleep. Stanley looked down at him.

"When?"

"Some time during the night." Thorne's voice was harsh with strain. "Leman shares this cabin with him. He called Hemridge this morning and found him like this. He notified me immediately." He sucked in his breath. "I don't like it."

"Why not?" Instinctively, Stanley moved away from the bunk. "Couldn't it have been natural illness? Something

organic?" He was clutching at straws and he knew it. "We can't be certain that he picked it up from outside."

"He didn't die from anything we brought with us. No pain, remember, no symptoms at all." Thorne frowned. "Last night! He was sick then and I didn't know it. Remember how he looked?"

"He said that he was tired," reminded Stanley. "Natural enough when you remember how hard he'd been working. We all felt a little pooped. As for the pain, he could have discounted it, or forgotten it in the pressure of work. That's happened before, too, you know." He stared at the dead man. "Can you find out what killed him?"

"I can try." Thorne didn't sound too eager. "It won't be easy. My equipment is only intended for normal injuries, not for an intensive pathological investigation. I'll have to perform an autopsy, mount slides, take smears, breed cultures, all the rest of it. It will take time."

"Take all the time you need," said Stanley grimly. "One thing is certain—we

daren't land until we know how Hemridge died. Need any help?"

"Only to get him to the sick bay."

"I'll help you." Stanley gripped one end of the thin, rubberoid sheet and, with Thorne at the other, helped carry the dead man into the compact sick bay. They dumped the body on the operating table and, while Thorne scrubbed and protected himself, Stanley broke the news to the others.

"Hemridge is dead," he announced bluntly. "As yet we don't know what killed him. I don't have to tell you what that means."

Hedidn't. Theyhadaccepted the risk and now they had to accept the possibility of paying the price. But somehow, maybe because no one yet had ever had to pay that price, it was still something to be talked about, the sort of thing which could happen to others but never to them. And so they reacted in a typically human way.

"You touched him!" Klien stepped away from Leman. "You shared the same cabin

with him. Stay away from me."

"How about that, Cap?" Leman had turned very white.

"What can we do to protect ourselves?"

"Nothing."

"Nothing?" Leman looked hurt. "That doesn't make sense. If Hemridge died from some disease we don't want to catch it, too."

"And what makes you think that you haven't already?" asked Stanley impatiently. "We've all shared the same food, the same water, breathed the same air. We've all been outside and we've all been in close contact. We don't know that Hemridge died from some alien virus, but if he did there is nothing we can do about it. If it's here then we've got it. If it isn't then it can't hurt us. In any case, there is only one way to find out—wait and see."

And that was the hardest part.

Waiting, any kind of waiting, is bad. Waiting to discover whether or not death is inevitable is worse than just bad; that kind of waiting is the father of insanity. They fought against it, of course.

Men being what they are, they had to. The view-tapes helped, their own optimism helped even more, but there was only one man who could totally vanquish their fear.

It took a long time.

Thorne emerged at last, his eyes red with lack of sleep, his face haggard with strain. Silently, he set up a microscope in the rec-room and carefully adjusted a slide.

"Did you find it?" Stanley refused to let himself feel hope. "You know what killed him?"

"I know."

"Well?"

"It isn't a virus." Thorne smiled crookedly at their gasp of relief. "Not that it does us any good."

"Why not?" Leman, his face flushed and beaded with perspiration, thrust himself forward. "I knew that we had nothing to fear from an alien virus. We're too far divorced for it to be able to affect our body chemistry. The entire concept is ridiculous."

"Then what killed Hem-ridge?" said Klien impatiently.

Thorne shrugged. "Look." He pointed towards the microscope. "You look, Leman; it should interest you."

Leman stooped for a long time over the eyepiece and, when he finally straightened, he seemed puzzled. He stopped for a second look.

"Bugs," he said. "Insects. Like ants, or spiders, or beetles, or . . ."

"A mixture of them all?" Thorne nodded. "Odd, isn't it?"

"You got these from Hem-ridge?" Stanley straightened from the eyepiece as Klien took his turn.

"I did."

"They killed him?"

"Yes."

"Then we're safe!" Klien almost shouted in his relief. "We can protect ourselves, kill the bugs and flame-burn the ship." He began to laugh. "Hell, we've fought insects all our lives back home, and we win every time."

"Do we?" Thorne shrugged. "I rather doubt that, not while insects still outnumber men by several million to one, but that doesn't matter. You

all seem to have missed the point. These things are small, yes, but so is a virus. These creatures breed at an incredible rate, *and they can breed within flesh.*" He swallowed. "Hemridge was alive with them."

"I don't get it," said Leman helplessly. "Where did they come from? Why should they attack us? Thorne! If you know, tell us quick. Have we got a chance?"

"No." The doctor stared at Leman with something like pity. "You still don't understand? Those insects are the alien race we were looking for. We found them and we didn't know it. They were there all the time."

"No! I can't believe that. That city was enormous, the tunnels were huge, and yet those things are so small you need a microscope to see them. It doesn't make sense."

"Bigness," said Thorne tiredly. "Smallness, what do they really mean? We are used to small insects building small, big creatures building big, and we tend to carry that yardstick with us wherever

we go. And yet what of the African ant hills? They are pretty big for so small an insect. And coral, entire reefs and islands made by tiny creatures. We have the analogy on our own world. In effect that city we discovered, the entire planet even, was one colossal coral reef—and we had to go and wander around in the very heart of it."

"The structure was of metal," stammered Klien. "Hemridge analysed it."

"Which is why he was the first to die. He handled it with bare hands while the rest of us wore gloves. Not that it makes any difference, it merely delayed, not prevented what must happen."

"But metal?"

"Why not?" asked Stanley bitterly. "More wrong frames of reference. We tend to label everything so as to make it familiar, and then we treat the thing as if it *were* familiar. Metal does not contain insects—so we ignored the possibility of alien material containing alien life." He looked down at his hands. "A different metabolism, of course,

they live on metal and, like coral again, the structures were fashioned from their dead bodies."

"Yes," said Thorne. "We picked them up, they slipped through our pores, and surrounded by food, began to breed. The human body contains iron and other minerals which they could use. The strange part, to me, is that the process is painless. They must secrete some fluid which deadens the nerves and tissues around them and, of course, they are very small. Finally, they cause death and final breakdown." He shuddered. "Hemridge's body literally collapsed into liquescent jelly."

"So we're all going to die." It was a statement, not a question, and Stanley knew the answer before Thorne nodded.

"Yes. They are everywhere in the ship by now. The metal alone must be rotten with them. In time they will convert the ship into a shapeless blob of sponge-like alloy. We can't get rid of them, and should we land, they will spread and spread, and spread.

They aren't a virus, you see, and there can be no immunity. The only safeguard is to volatilise the ship or isolation." Thorne stared at the captain. "Complete isolation."

And that was that.

Stanley entered the engine room and looked for a long time at the humming bulk of the hyper-drive. The built-up field would last for a long, long time. Far longer than it would take to drive the ship and all within it right out of the known galaxy. It took force to generate the field and force to collapse it. And if the force wasn't there . . .

Stanley made sure that no one could ever collapse the field.

That done, he walked slowly back to the control room and sat staring at the swirling rainbow patterns on the screens.

It was going to be a long journey.

It was going to be the longest journey any man could ever make.

It was going to last all his life.

The way to the Planets

by A. E. ROY, B.Sc., Ph.D., F.S.A.S., F.B.I.S.

10—Project Moonbase

IN THE BOOK, "ACROSS THE Space Frontier," Professor Wernher von Braun said: "The first attempt to land on the Moon will be a daring undertaking for a small crew travelling in a single ship." This assessment of the risk the first expedition will face probably hits the mark squarely. The operation of landing a spaceship on a body such as the Moon, which possesses no atmosphere, will be a decidedly tricky one. Although many papers on the establishment and potentialities of the lunar base have been published, relatively few authors have considered the actual landing. It will be the prototype of all landings on airless planets.

Firstly, winged rockets are out of the question. Indeed, wings would be a positive hazard, being so much extra dead-weight, and this consideration is one more reason why spaceflight pioneers believe more than one type of spaceship is required. The three-stage satellite rocket

must obey the laws of aerodynamics, especially in its third stage which, on landing, will use braking ellipses through the Earth's atmosphere to destroy its excess energy. But wings are useless when there is no atmosphere; therefore, the landing craft that ferries the expedition down to the lunar surface must be designed for that specific job.

In designing that craft, we must consider in particular the approach trajectory, the mass to be landed, the maximum strains materials and crew can be subjected to in the lunar gravitational field and the type of terrain to be landed on. Last month it was seen that the Moon's surface was by no means smooth, and it is unlikely that the expedition would chance a horizontal landing by skidding over the surface, since it is easily calculated that the speed of landing would be over one mile a second! While it seems certain that preliminary non-landing expeditions in

circum-lunar orbits will have studied and photographed promising "landing grounds" and even made a few test drops to judge their solidity and nature, it is evident that a horizontal landing on even the most promisingly level stretch would be foolhardy. In addition, the expedition has to take off after its stay, and that take-off must be made vertically. With no cranes around to raise the ship's nose, the task would be impossible. Thus we can say that the landing will be made vertically, and design our vehicle accordingly.

Having broken away from the circum-lunar orbit in which the return journey ships and fuel have been left, the landing craft is put into a closed orbit close to the lunar surface. From this intermediate orbit the final approach will be made. Knowing the elements of the orbit, computed from observations by the methods of celestial mechanics, it is possible to predict future positions and velocities. The computer-member of the crew, possibly still in the circling ships above, then calculates the rocket-blasts necessary to bring the landing craft to a dynamic rest at any height above the lunar surface.

This computation can be carried out leisurely, since the landing craft is in a stable orbit and is not consuming any fuel. In fact, the craft may remain a considerable time in this orbit, making many circuits of the Moon, until the computer is satisfied with the accuracy of his calculations. His firing programme is now given to the pilot, who brings the ship to the rest-point above the surface of the Moon. At that point the vehicle will have its rocket motors firing downwards and the pilot, using a radar altimeter, will then ease the ship vertically downwards to a landing. It is seen then that only in the final manoeuvre is the ship left completely to the skill of the pilot in making on-the-spot decisions. Just before contact with the ground, the motors are cut and the ship falls freely the rest of the way. Arthur Clarke has pointed out that even today helicopter undercarriages have been made strong enough to take rates of descent of 40 feet a second. On the Moon, where the surface gravity is one-sixth that of the Earth's, this strength of undercarriage could withstand a fall from 160 feet. Thus, even if there

is a final error in estimating the height when the motors are cut, the undercarriage could be designed to allow for this.

The undercarriage, equipped with shock absorbers, will be wheelless, because of the vertical descent and ascent. It will consist of a number of legs at the feet of which are broad, flat plates. Theoretically, only three legs are required to support a structure, but—as anyone knows who has ever sat on a three-legged stool!—to provide stability, at least four should be provided. In addition, the greater the number, the smaller will be the strain on each. These legs are carried outside the main body of the vehicle and prevent the nozzles of the rocket motors from touching the lunar surface. In case of uneven firing from the motors, which would cause the ship to depart from a vertical aspect, it has been suggested that means of correcting such a tendency should be provided. This can be achieved by using small side-rockets, or providing a system of small, massive flywheels inside the ship to utilise the law of the conservation of angular momentum. In practice, the side-rockets are more likely to be used,

since the use of flywheels is a slow business, and the corrections should be applied as quickly as possible. In addition, for greater stability, the height of the landing craft should be as near its width as is conveniently possible. The vehicles planned by Professor von Braun and described in *COLLIER'S* magazine three years ago used nitric acid and hydrazine as propellants, were 160 feet long, 110 feet wide and weighed 4,370 tons completely fuelled. In this design, however, they were built in an orbit 1,075 miles above the Earth and were landed on the Moon without the use of special landing craft. But these monsters are unlikely to be used on a first expedition, so that von Braun's own description, quoted at the beginning of this article, probably describes more correctly the first landing-party's resources.

Thus, in the way sketched above, which follows a design of Mr. R. A. Smith of the British Interplanetary Society, the picture of a lunar landing craft is built up, a squat, ugly, unstreamlined affair of fuel tanks, cargo and living compartments, rocket motors and undercarriage, held together by a girder framework.

As it descends, its downward-firing rockets may stir up clouds of dust, and heat the sub-rock so that time may elapse after the landing before the crew, extremely thankful to be alive, are able to leave the ship.

Before the first permanent and well-equipped Moonbase is established, all exploration must be carried out by men on foot wearing spacesuits. The provision of a spacesuit capable of standing up to the conditions of extreme heat and cold found on our satellite is a formidable task. In a long, detailed paper published some five years ago in the *Journal of the British Interplanetary Society*, H. E. Ross, in co-operation with R. A. Smith, designed a spacesuit of weight 150 lbs. (25 lbs. on the Moon) containing an oxygen supply sufficient for 12 hours' service.

These first few explorations by the first men on the Moon will have clearly-defined objectives. Since a landing craft can carry only limited stocks of air, food, water, equipment, etc., time is precious, so that each minute must be used to its full advantage. The information of highest priority would be that concerning the composition of the Moon's

crust, since the materials available to hand will dictate the requirements of future expeditions. It has thus been suggested that a suitable place for landing on the Moon is in the vicinity of the Great Wall, a fault some 500 feet high and some 60 miles long, situated about 300 miles north of Tycho. Here, the explorers would have for inspection a 500 foot section of the lunar crust without boring. In addition, if no caves are found there, and it is desired to place the first temporary Moonbase underground, a horizontal tunnel might be driven into the Wall to accommodate the base.

Thus, with the first landing craft acting as base, the area around it will be explored by the crew, each man keeping in radio touch with the ship. Clarke suggests that to increase the range, an aerial—perhaps an inflated rubber tube—would be erected, a height of 50 feet giving a range of six miles.

After some years, the Moonbase should have taken on a semi-permanent character. It may consist of inflated fabric or plastic domes set underground in caves to utilise the insulating properties of the lunar dust and rock. Many

problems have to be tackled when buildings containing air are constructed in a vacuum. For example, if internal air pressure is 10 lb. per square inch, there is a force of over half a ton over each square foot, tending to explode the building! For this and other reasons, it is extremely unlikely that the Moonbase will have much of its construction above ground, but will be situated in caves, or in narrow clefts below ground, in the vents of extinct volcanoes or in artificially blasted pits. Indeed, if tunnels and caves are found or constructed, the air pressure in them would do away with the need of "pit-props," the weight of rock overhead balancing the upward push of the air. Such lunar accommodation, of course, would require one or more airlocks for entrance and exit.

P. L. Sowerby has calculated that, allowing for the reduction of weight on the Moon, the approximate depth of a tunnel in material of similar density to granite, sandstone, etc., which is about 150 lbs. per cubic foot on Earth, would be between 50 and 60 feet. If the material is porous, he goes on, cement plastering would be required,

so that the air is unable to penetrate the roof. He lists three ways in which lunar materials may be made use of in building: (i) as aggregate for use with cement in the production of concrete if small enough; (ii) as rubble walling for internal partitions and occasional external works; (iii) the largest rocks may be cut to shape for special uses, e.g. doorway lintels or floor beams.

Sowerby concludes, like others who have studied these problems, that the possibility of extensive surface construction is exceedingly remote, but that there are no limits to the extent of an underground base, other than those imposed by the excavating equipment available and the depth requirements to balance air pressure with weight of rock.

While the Moonbase of a few years' status would by no means be self-supporting, it would enable larger areas of the lunar surface to be prospected. By the methods of polar explorers, rockets could drop supplies of air, food and water at points many miles distant from the base, so that expeditions from the base, using inflated, flexible, suitably insulated domes to sleep in, could utilise these supplies

to explore further. The benefit of operating from a well-equipped base would be that most of the expeditions' time would be profitably spent collecting the research material. This material would be brought back to the base's laboratories to be tested there.

At this exploratory stage, shuttle rockets from the Earth would still be bringing the supplies necessary for life and research in the base. But the objects of research and exploration would include the task of making the lunar base as self-supporting as possible. Another object would be to hasten on the day when rocket propellants could be manufactured on the Moon and exported from the satellite. For it can easily be shown that it requires

less fuel to carry a mass of material from the Moon's surface across the 240,000-mile gap to a 500-mile orbit about the Earth, than it takes to raise the same mass of material from the surface of the Earth to that orbit. Thus, if fuel can be manufactured on the Moon, it will be used to refuel the spaceships destined to reach Mars and Venus and to refuel the shuttle rockets bringing supplies to the lunar base.

In this way, right from its foundation, the lunar base will have well-defined objectives which, if realised, will enable the next steps in the conquest of space to be taken more easily and more quickly than they would be without our nearest neighbour in space.

WORLD SCIENCE FICTION SOCIETY

ARTHUR C. CLARKE, the noted author and rocket pioneer has been chosen as guest of honour at the 14th World Science Fiction Convention to be held at the Hotel Biltmore, 43. St., Madison Ave., New York 17, N.Y., U.S.A.

Selection of Mr. Clarke, former chairman of the B.I.S., was announced by David A. Kyle, president of radio station WABY, Albany, N.Y., who said: "Mr. Clarke has been chosen as guest of honour because of his contribution to science fiction as the newest field of literature, over a million copies of his books having been published in twelve languages, as well as his inspiring leadership in investigating the possibilities of space travel."

At the 1955 Convention in Cleveland, the guest of honour was Dr. Isaac Asimov, Boston University biochemist and science fiction novelist.

More than 1,000 delegates from the United States and other countries are expected to attend the 1956 Convention at New York.

He wanted to be the first—

LONELY IMMORTAL

by RON PAUL

JOHN WENDLE NIXON strode briskly across the room and shook hands with the scientist. "You're Professor Rand?"

"I am."

"According to the Press," said Nixon directly, "you are able to give a man immortality . . ." He ended with a purposeful abruptness that carried with it a question.

Rand smiled. "Newspapers are apt to over-emphasise the possibilities of a discovery and ignore the more practical implications. But—if you're interested—I'll explain." He led the way to a small room off the main laboratory.

"For many years," he began, "I—and my associates—have been studying time. After completing one particular aspect, our findings were released. As I said a moment ago, the interpretation given by the Press does not give an accurate picture of the results we have achieved—"

"Never mind all that," interrupted Nixon. "Is immortality possible?"

"In theory—yes. But there are set-backs, Mr.—er——?"

"Nixon, J. Wendle Nixon. You've probably heard of me."

"I can't say I have . . . However, as I was about to say, we have experimented with various animals, and we can only assume the results were successful—"

"But, don't you *know*?"

"Please, Mr. Nixon, if you would refrain from interrupting I could explain a little easier. It is all based on the supposition that time is a constant stream. We have built machines which set up an opposing force; this halts the time-stream for any object within five and a quarter feet from the machine. Naturally, its scope could be increased."

"But surely you know whether your experiments succeeded or not!" said Nixon.

"We expected the animals to disappear—they did. That's all I can commit myself to say."

"You sent them back through time, then?"

"No, no. They are living in the moment that existed when the opposing force was built up by our machine—rather complicated to you, I suppose. Shall I put it this way? They stood still in time so that, as the main time-stream progressed, we left them behind. That's why we can only suppose the experiments were successful; we cannot examine the animals because they belong to the past and are inaccessible."

Nixon grunted. It was complicated, but he was beginning to understand. "What happens when the force-field is collapsed? Surely, the animals should return to the present?"

"Oh, no. The force still exists in the particular moment in time when it was created. This acts as a barrier between *then* and the present that will exist eternally"

Nixon was silent.

The scientist smiled at his visitor and rose. "I suppose that has shattered your desire to become our world's first immortal, so if you'll excuse me . . ."

"No, wait, professor. I'm

intrigued. Tell me, what sort of existence will those experimental animals be undergoing?"

"Quite a simple one, Mr. Nixon. They will exist within approximately a time span of one minute. This is because we assume the force barrier set up against their particular time-stream will have a buffering effect that may cause them to rebound back about 60 seconds. As each minute elapses, they will reach the barrier again and rebound. Therefore, we can say they will be existing within that particular time span. They will not age, so we can safely assume that these privileged animals *are* immortal."

"So," Nixon breathed. "It *is* possible!"

"Only theoretically——" Rand insisted.

"Could you build a machine to send a man into the past?" demanded Nixon excitedly.

"Mr. Nixon, I told you, the subjects are not *sent* into the past. A selected time-stream is halted so that progressing time leaves the subject behind . . ."

"Never mind about in-

significant details. Can it be done?"

"It is possible to treat a man the same way as those animals, but I will not commit myself to say——"

"Professor Rand, I want you to perform this experiment of yours—on me!"

The scientist sighed. "My dear Mr. Nixon, too many points are involved. The—the law, for instance! Why, it might be taken as murder, or—or——"

"Suppose I signed an agreement to subject myself to your experiments?" demanded Nixon. "What then?"

"Even supposing the legal points were overcome, what of my reputation? No, Mr. Nixon, I could not possibly——"

"Listen, Rand, I'm a wealthy man. I was surprised you had not heard of me. I also have a great deal of influence. If I made the whole thing legally sound, with your name protected, could you do it?"

"Yes, I—I suppose——"

"Then, it's agreed!"

"Please, Mr. Nixon, I have agreed to nothing. If you

will listen to me, perhaps I can convince you to change your mind . . . Firstly, the shock of the force field repelling your time-stream might kill you." Rand was watching Nixon for any sign of hesitancy, and was disappointed to see this statement had no effect on the man.

"Do *you* think that would happen?" asked Nixon carefully.

The scientist was grudgingly truthful. "The human body should be able to over-ride such a shock, but we cannot tell. It is possible——"

"But not very?" suggested Nixon.

"Another point is this," went on Rand hurriedly. "You might be sentenced to eternally think the same thoughts that entered your head during the time span which you would occupy."

"But you don't think that's possible, either?" pursued Nixon.

"I, personally, believe that the mind is independent of time. I believe constructive thought to be possible whilst living in this state of suspended

time, but again, it is only theory."

"How about food and that sort of thing?"

"The conditions that prevail at the moment the subject is severed from the present, should exist permanently. Thus, no replenishments will be necessary."

Nixon was pleased with the replies. "Thank you for being honest with me. Professor Rand, will you do it?"

"I beg you to think about it. Remember, if your time-stream was halted, your surroundings would be permanent."

"What the hell does that matter? Will you do it?"

"Mr. Nixon," said the scientist, smiling artificially, "why do you wish to become immortal?"

He laughed. "Who wouldn't?"

"An eternity devoid of friends—of laughter? Devoid, almost, of life itself?" Rand shook his head thoughtfully. "I do not wish for such an existence."

"Very well, I'll tell you, professor. I am tired of this world; I'm tired of wealth

and the cringing fools it attracts as friends; I am tired of people—sick of their hypocrisy. Sometimes I feel I would rather die than live another day, yet I fear even the thought of dying. Then, above all else, this damned world is going mad. Countries are squabbling, even though the world might be blown apart if another war begins. But everything seems to go on madly, leaving me behind trying to catch up—like your damned time theory. Well, let the world leave me behind—in peaceful immortality!"

"I must say," said Professor Rand deliberately, "that you are doing a very noble thing to help civilisation avoid war—by running away to hide in a dark corner."

"Leave personal motives out of this," snapped Nixon. "Will you do it?"

"I'll think about it," said the scientist wearily. "I'll have to think about it . . . Leave your address with my assistant. I'll let you know."

"Remember," said Nixon, rising heavily, "I am not a coward as you seem to suggest. It takes a brave man to

volunteer becoming a guinea-pig to one of your experiments!"

"No," said Rand, "not a brave man; only a blind one. Good afternoon."

Nixon lay on the bed trembling a little. Fear was only natural, for very soon he would be cut off from this mad world to become immortal.

IMMORTAL. The word shouted at him.

Professor Rand had installed the equipment in Nixon's own bedroom. Nixon was to lie on the bed to cushion the shock; that way, it was more likely that he would survive the change over from the present to a marooned part of time that would, ever increasingly, become a forgotten past.

"Are you ready?" came Rand's voice.

His body shook excitedly. "Ready!" he quavered.

"We're starting up the machine. It will take quite a few minutes to build up maximum force, so don't expect immediate results. Just keep relaxed."

He waited. Outside, the church clock struck midnight. Exactly the time they had planned to begin, so that he would be isolated on a quiet peaceful moment in time that could not disturb his enjoyment of immortality.

IMMORTALITY!

He almost laughed as he realised that long after Rand had died, and his son, and *his* son, he would still be living and thinking great thoughts! It obsessed him until he became almost frantically impatient. He wanted to be severed from this damned world now. *Now!*

"Sorry," came Rand's voice. "We can't seem to get it to build up sufficient power. We'll have to make adjustments. Get some rest while we work this out. It may take hours."

Nixon switched off his bedside lamp and, for a while, watched the scientists working under the light fitted over the machine.

Then, uneasily, he slept. He woke once as the church clock was striking two, loudly. He looked round. Rand was still working feverishly and

the shaded light above the machine shone on his assistant, mumbling some calculations.

Nixon settled down once more and slept. So tired . . . wonder when they'll get it done . . . ? All the money spent on the blasted thing and then it doesn't work . . . so tired . . .

He awoke again with a start. It was quite dark all around and he groped feebly to find his bedside lamp. He heaved a satisfied sigh as he found the switch and pressed it.

It wouldn't work. He was in darkness.

Outside the church clock was chiming. It jarred into his brain and he counted the strokes automatically:

One . . . two . . . three——

Three o'clock! Haven't they got the machine working yet?

He settled down to sleep once more.

Something disturbed him with a jar. He sat up and looked around, trying to recollect his thoughts . . .

Outside, the church clock began to chime. He counted the strokes: One . . . two . . . three——

Three o'clock!

But it had struck that a moment ago! Why——

Of course! It had worked. Rand had done it. Nixon was suddenly jubilant. He was isolated, alone, on a stretch of time.

Something jarred him lightly and he almost laughed as he realised what the sensation was.

Outside, the clock began to chime: One . . . two . . . three.

Damn! Wish there was some light—but that's impossible, because there was no light when the change occurred. Surrounding conditions are permanent, Rand had said.

God! An eternity in darkness!

Imprisoned within the same endless sixty seconds of darkness, with that constant jarring every minute—and that clock! That *clock*!

Something jarred his body quite lightly and outside the clock began its clanging chimes one . . . two . . . three——

He started to scream shrilly as it began striking for the eleventh time: One . . . two . . . thr——

It's not always an advantage to be——

Tailor Made

by

ANTHONY BLAKE

IT TOOK ALL HER COURAGE to do it, but after it was done she didn't feel so bad. Once the door had swung shut behind her and the receptionist, a plain, motherly looking woman, had smiled at her, Sarah felt that she was among friends. Understanding friends at that.

"I quite understand, Miss Good," said the receptionist, after Sarah had explained why she had come. "There is no need for you to feel the slightest bit embarrassed. Why, this Bureau has been established for over three hundred years now, and you'd be surprised at the number of clients we have managed to satisfy. Quite well known people some of them, too."

"Really?" Sarah forced a smile. "I've always been under the impression that a matrimonial bureau was not . . ."

She hesitated. "Not quite the thing. Or so people say," she continued hastily as she saw the other's expression. "I've never been able to see anything against them myself."

"I should think not!" The receptionist sounded hurt. "Why, we are as essential to modern living as say a dentist or a business advisor. If I were to tell you of the public figures who have patronised us . . ." She shook her head as she reached for a pad of forms. "Now, dear, just a few particulars and I'll send you in to Professor Moray for your medical. If you'll just thumbprint this authorisation against your account for the preliminary fee? Thank you." She poised her pen. "Age? Real age, if you please. Address? Occupation . . .?" The questions were many and

varied, so varied that Sarah felt acutely embarrassed once or twice and had to remind herself that all this was for her own good. Even at that she was glad when it was over and the receptionist announced that the professor would see her now.

The professor, an elderly, fatherly, white-haired man, bustled about with clinical interest as he adjusted various instruments.

"Good, strong bone structure there, Miss Good. The legs could be a little straighter, but otherwise not a bad skeleton at all. Clear skin, too, though that isn't really important. No fat, but that could be an advantage, especially in a hot climate. Hair . . ." He pursed his lips. "Blood, fair, a deficiency in female hormones, but that can be rectified. Teeth, well, they can be rectified, too." He stepped back rubbing his hands. "I don't think that we have much to worry about, Miss Good. In fact, I'd say that you are very promising material, very promising indeed. Off-hand I can think of at least three planets where you should be ideally suitable."

"Planets?" Sarah looked dubious. "Do you mean that I'll have to travel?"

"Why not?" Moray seemed surprised. "It isn't as if there was any danger or hardship. Just step into the Demat transmitter at this end and step out at your destination. Simple."

"Yes, I know, but I'd hoped . . ."

"Well, come now, Miss Good. You do want a husband, don't you?"

"Of course." This time she didn't feel embarrassed. "That's why I am here."

"Exactly, and that's why you'll have to travel." He smiled kindly down at her as she adjusted her dress. "No need to worry, my dear. Believe me, I've seen far worse specimens happily suited in their new surroundings. But Mr. Fenshaw will explain all that."

Mr. Fenshaw was the youngest person Sarah had yet seen in the Bureau. He nodded to her from across his wide desk and resumed his study of her documents. He seemed particularly interested in her credit rating.

"Well, Miss Good, Professor Moray informs me that you present only a minor problem. Some adaptations will be necessary, of course, but nothing too serious or,

I'm happy to say, too expensive." He leaned back and smiled at her. Sarah felt that she had to say something.

"Thank you, but is all this really necessary?"

He blinked. "All?"

"Yes." She tightened her lips and remembered that, as she was a customer, therefore she must be in the right. "I understood that you would introduce me to prospective husbands and . . ." She broke off at his expression of horror.

"My dear Miss Good! Surely you must be joking?" He regained his composure. "In the early days of our existence I will admit that such procedure was the prime function of the Bureau, but times change, Miss Good. Progress comes to us all and, I'm proud to say, we have made full use of science and advanced technology to improve our service to the utmost."

"I understand that," she snapped pettishly. "But you're not answering my question."

"Indeed, I am," he insisted. "Now, in the early days, long before the Demat transmitter enabled us to colonise the stars, all we could do was, as you point out, to introduce persons who had a mutual

need for a soul-mate." He coughed delicately in apology for having touched on a questionable subject. "Even then we did our best to ensure a good match. Psychological tests, aptitude tests, you'd be surprised at the trouble we took." He sighed. "Even at that it must have been very unsatisfying in the old days. Purely a hit or miss speculation. Why, though you may not believe this, our records show that some customers were on the books for as long as a whole year before being suited." He smiled. "Nothing like that can happen today, of course. We guarantee success."

"How?"

"Now there you have it." He leaned forward again, glancing, possibly by accident, at her credit rating. "Now we have dispensed entirely with the hit or miss technique. Now we can positively guarantee to make you an extremely attractive woman." He smiled again; he had good teeth. "After all, isn't that what you want?"

It was true, of course, that was what she wanted, but a lifetime of learning the hard way that she was possessed only of negative attraction

had soured her capacity for belief.

"We do it quite simply," he continued. "As things are, and if you will pardon me for referring to the matter, you are not attractive to the men of Earth. You are forty-two years of age, single, without a boy-friend and . . ." he glanced at the questionnaire, "without experience. In short, you are a failure in your own culture. If you weren't, then you would never have felt need of our services." He hesitated. "I take it that you have patronised the cosmeticians?"

"I have," said Sarah grimly. Even now she didn't like to think of all the time, money, pain and inconvenience she had wasted on the futile chase of an ideal. Fenshaw nodded.

"Exactly, and they failed to satisfy you. We shall not fail."

"Is that why I must travel?"

"Yes. You see, Miss Good, we must attack your problem from the logical standpoint. If you are not attractive to the men of Earth, then we must send you to a planet where you will be considered to represent the height of beauty. Trying to find you a suitable mate here on Earth would be a

waste of time. We could possibly find you a prospective husband here, but, to be frank, he would be no catch. That's obvious when you think about it, isn't it? Also, even if you did manage to get suited, you would still be suffering from the comparisons he would be making with other women."

"I'd risk that," she said. "My trouble isn't keeping a husband, it's getting one."

"A poor solution to a problem is no solution at all," he said severely. "We can do far better than that by attacking the problem at its roots." He became pedantic. "You see, we operate on the truism that beauty is purely in the eye of the beholder. What one section of humanity finds attractive another may find repugnant. Avoirdupois, for example, is appreciated far more in the tropics than in the temperate zone. A dark-skinned woman with an artificially elongated neck, while not a marriageable prospect in Iceland, would be eagerly sought after in the Congo. You follow me?"

"I think so," she said slowly. "It's all a matter of local preferences and tastes." She glanced down at her

contourless chest. "Apparently I don't meet local requirements."

"Unfortunately, no, but to make you attractive all we have to do is to adapt you to meet the standards of any one of a number of planets. There, instead of being an outcast, you will be the epitome of female beauty." He gestured with his soft, well-kept hands. "I need hardly stress the inevitable result."

"The queen of the planet," Sarah breathed, and her sallow cheeks burned as she thought about it. "I'll be able to pick any man I choose."

"Exactly. Now you can understand why the Bureau, using the benefits of modern science, is so successful." Abruptly, Fenshaw became businesslike. "Now let me see. You're thin. Procyon IV likes them slender. But they also like long, thick hair, slanting eyes and . . ." Regretfully he shook his head. "No. Procyon IV is out. The surgery would be too extensive and expensive, and the basic material unsuitable." He lifted a heavy file onto the desk and began to riffle through the cards it contained while muttering to himself.

"This . . . poor hair . . .

poor teeth . . . no figure . . . skin . . ." He pursed his lips. "I'm afraid that we'll have to make a few adaptations, Miss Good. Have you any objections?"

"Permanent adaptations?"

"Of course, but fortunately they need only be minor." He riffled the cards again. "We can remove your hair and . . ."

"Remove it?" Sarah touched the scanty locks over which she had taken so much trouble. "Make me *bald*?"

"Yes. A follicle-killing injection will do the trick almost without pain and the cost is low. Hairless women are in high esteem on Deneb III. The local women have to use shards of obsidian to shave themselves, or rather they did until the trading posts began selling them razors, so you will have a tremendous advantage in that fact alone." He hesitated. "There are one or two further adaptations . . ."

"Haven't you a planet where I'll be attractive without all this?" Somehow, the thought of going through life as hairless as an egg didn't appeal to Sarah.

Fenshaw looked regretful. "I'm afraid not. It's a question of divergent cultures, you

understand. Any culture which could appreciate you as you are would have tastes so near to our own that the local competition would, quite literally, put you right back where you started." He riffled more cards. There's Rigel X. They would find your slenderness attractive, but they also insist on hairlessness and, moreover, demand an intricate scar-pattern on the face and torso." He turned more cards. "Pollux V. They have no objection to hair, but they like tall, shapely women." He shook his head. "Fomalhaut II? No."

"Why not?" Sarah was getting worried as the rosy dream of being the foremost beauty on a planet began to fade. "What's wrong with Fomalhaut?"

"They're an amphibious mutation," he explained. "You'd need webbed feet, gills, and a vestigial tail." He returned to the file. "Sirius XX. Again they dislike hair, but they prefer women short, dumpy and pneumatic. Also," he coughed, "their marital customs are inclined to be a little . . . well, hectic, shall we say? I really think that Deneb III would be best."

"All right, then. If you say

so." Having gone so far Sarah was in no mood to back out now. She wanted a husband and she wanted him fast, and if she had to suffer a little in order to appear beautiful, well, since when have women ever refused to do that?

"Good." Fenshaw sounded relieved. "We'll remove all your hair then, and stain your entire body . . ."

"Stain?"

"Yes. Another facet of their cultural pattern. Some radiation from the sun has mutated the melanin so that, instead of tanning a normal brown, they tend to acquire a purple shade. It's nothing repulsive," he said hastily, as he saw her expression, "but, naturally, they appreciate the same colour in their females."

Sarah hesitated, then nodded. It was, she supposed, no different from women admiring sun-tanned men.

"We'll give you an overall tattoo of the most desirable shade," continued Fenshaw. "And then there is the question of your teeth."

"Teeth?"

"Ridiculous, I know, but they prefer them to be pointed. A left-over from their primitive state, I suppose, but there

it is." Fenshaw sighed as though he carried the weight of the world. "No hair, pointed teeth. I suggest a full set of dentures, tattoo and . . ." He frowned. "Was there something else?" He checked back on his cards. "Ah, yes."

"Not a skewer through my nose," protested Sarah hysterically. "I won't stand for that."

"Merely a glandular adaptation," soothed Fenshaw. "It's a matter of body-odour. The inhabitants of Deneb III like it fairly strong. We can soon fix that with a couple of injections and an electronic needle." He glanced at Moray's report. "Yes, no trouble there at all. I see that you are already deficient in female hormone, so we'll throw in a course of that as well. It doesn't cost much and can do you nothing but good." He leaned back, smiling. "Well, Miss Good, there it is. The entire treatment is extremely reasonable and," he glanced again at her credit rating, "one which you can easily afford. In return we guarantee to make you one of the most attractive women on Deneb III."

He paused, waiting for her answer, and Sarah thought it

over. The treatment did appear to be a little drastic, but remembering her experience at the cosmeticians, she couldn't see a tremendous amount of difference. And if it meant that she would become numbingly attractive? She looked at Fenshaw.

"You're certain about what will happen? I mean, I will be beautiful, won't I?"

"We guarantee it." Confidence oozed out all over him. "You'll be tailor-made to fit their requirements and you'll beat the natural product hands down. Frankly, I can't see why you hesitate. On Deneb III you'll be so busy fighting off men that you won't have time to think. Just imagine," his voice became persuasive, "you won't ever be lonely again. You'll have a dozen young men hanging around just longing for a smile. You'll be able to take your pick and marry whom you choose. Why, if I were a woman, I wouldn't hesitate one little bit. I'd get in there and start making up for lost time." He picked up a pen. "Sign the agreement and waiver now, and the professor can start the treatment at once."

"Waiver?"

"Just an elementary pre-

caution," he said smoothly. "Think nothing of it. Well?"

The prospect was tempting, the pen was very close, and suddenly she was very, very tired of being an unattractive old maid.

She signed.

The first injections robbed her of all hair. All of it, even her eyelashes and eyebrows, so that she looked and felt like a freshly peeled egg. The tattoo, even with multiple needles and local anæsthetics, wasn't pleasant and, after the swelling had died down, she was resplendent in a brilliant shade of purple. The dentures took a little getting used to; the pointed teeth had a habit of catching on her lip. The body odour . . . well, she supposed that she could get used to that, too.

Finally, after a month in the private hospital of the Bureau, she was all ready for the great adventure.

"Now don't worry about a thing," said Fenshaw, who had come to see her off. "Always remember that, no matter how you think you

look or feel, beauty is solely in the eye of the beholder."

He steered her towards the portal of the Demat transmitter. "The trading post has been informed of your coming and the agent will be there to greet you. He's a native, of course, and, though I shouldn't say it, is considered to be one of the handsomest men on the planet." He gave her a roguish wink, then shook her hand. "Good luck, Miss Good, and don't forget to recommend us to your friends."

Sarah nodded and stepped into the portal. There was a moment of strain, a subtle twisting, and then she stepped out into the bright sunlight of Deneb III.

And stopped.

A thing stood looking at her. It was four feet tall and three wide. It was deep purple, as hairy as a brush, and with an odour capable of making rotten eggs smell like Chanel No. 5. It opened its mouth to reveal pointed teeth and rolled forward on splayed feet.

There was no mistaking the admiration in its eyes.

There is a place where—

THE EARTH NEVER SETS

by DAN MORGAN

THE OLD MAN FINISHED reading the list of names. We stood quiet for a full minute, each tearing down his own particular structure of rationalisation. We had conditioned our minds to think of it only as a possibility in the distant future, nothing more. All of us, except Chambers.

I looked across at him. His pale, thin-featured face was rigid, with the lack of movement that conceals a mind racing, struggling like a trapped beast.

"You've no right to do this, Colonel!" said Chambers in a brittle voice. "I demand that you let me go on the first ship."

All eyes were on him now. Nobody could talk to the Old Man like that and get away with it, even if he was a civilian.

"If you have any com-

plaints about your treatment here you may make them through the proper channels when you return to Earth," said the Old Man. "One man will return with the first ship; the one named at the head of this list. The order of priority was left entirely to my discretion and there was no mention of any special provision for yourself."

"But I'm not officially a member of the Base staff," protested Chambers. "You have no right to keep me here."

The Old Man's voice had an edge. "You are free to leave any time you wish . . . If you can make your own transport arrangements."

"You know that's impossible," said Chambers brokenly.

The Old Man looked at him contemptuously. "In that

case you will abide by my orders. I fail to see any reason why you should expect, or receive, preferential treatment." He glanced at the rest of us, a stiff ramrod of a man with greying fair hair. "If there are no further questions, you may go, gentlemen."

Outside in the corridor the others walked quickly away. They had little time for Chambers and his whining, and a great respect for the Old Man.

"Why does he hate me so, Sammy?" said Chambers.

I put a hand lightly on his arm. "He doesn't hate you. He's just trying to be fair. Whether you like it or not, we're all in the same boat, so it's no use kicking."

"But I didn't volunteer for this thing, remember?" said Chambers. "I'm not one of you death or glory soldier boys. I tell you I can't take much more of this."

He had a point there, of course. If his firm had not happened to develop exactly the right sort of nuclear-powered crawler tractor for use at Moon Base he would not have been there at all. As the engineer of the party, I could have handled the thing

easily, but some brass-hat back on Earth had decided that it would be a good idea if Chambers, its designer, came along and made sure that it performed correctly. It had been considered unnecessary to put him through the Psyche testing and conditioning undergone by the official members of the Base party, as he would be returning to Earth within a few months on the first supply ship.

The only snag about that arrangement was the fact that the first supply ship did not arrive, or the second . . . or any of the others.

Homesickness is a comic, sentimental term back on Earth. But it ceases to be funny when you're a quarter of a million miles away, without hope of getting back, except on that ship which never comes. We had been told that a supply ship would arrive at least once every six months. One of our members was to return with it for leave on each trip. That had been over three years ago. Homesickness had hit all six of us, despite our conditioning and the fact that five of us were volunteers in the first

place—but it had hit Chambers worst of all.

The Moon Base; *the newest and proudest outpost of the British Empire*, they called it in the newspapers back home. Every nation on Earth had been working at top pressure for over twenty years, but it was us, the muddlers, the good old stupid British, who got there first. We planted the flag there in the white dust and stood to attention in our space suits whilst the Old Man intoned the ceremony and added a quotation from Kipling for luck.

We had reckoned without Earth politics. There was hell to pay in the U.N. when the news of our landing broke. All the other nations who had been working unsuccessfully on similar projects yelled sour grapes loud enough to be heard up here at Base. If it had been one of them who had made it, they would have cocked a snook at the rest and told them to go chase themselves. But British diplomacy does not work that way.

In the face of accusations of dastardly imperialism, aggressive intentions and all the rest of it, our delegate got off his frock-tailed coat, smoothed his elegant moustache and

made what amounted to an apology for our unseemly conduct in showing such superiority of brains and guts. He went on to say that the Commonwealth government were prepared to discuss the matter of the Moon Base with a representative committee of member nations.

This quelled the storm temporarily and the U.N. committee on Extra-Terrestrial Colonisation was formed, under the chairmanship of the French delegate. The first motion passed by the committee was one forbidding the launching of spaceships by any nation until the committee had reached full agreement on the matters before it for consideration. The playing fields of Eton triumphed again, and our government concurred without a murmur of protest.

That was three years ago.

All very fine and ethical, except for one thing; we were stuck on the Moon. There was plenty of food, we were quite comfortable and we had our work to do, but it's a helluva thing to stand in the dust looking at your home planet shining away invitingly and know that you haven't a dog's chance of getting back there until some moribund

U.N. committee has stopped nattering around and finally decided something.

However, that was behind us now. A few hours before, Base H.Q. had received a radio message from Earth. Some sort of a temporary agreement had been reached and a supply ship would be on its way to us in a few days. The Old Man was instructed to make leave arrangements on the original basis, it being unthinkable to the brass-hats that we should all be given leave at the same time, despite the long delay.

Chambers and I had been working on one of the pressurised crawlers all the morning, at least I had. Most of the time he was just standing there looking hungrily at that greeny-blue globe, his lips moving silently, but saying to me very loudly what he was thinking.

Wilson was in the Mess when I walked in. This was no surprise; he must have spent at least two and a half out of the last three years there. The Old Man had obviously placed him at the top of the Leave Roster because he was the one person at Base we could most easily do without.

"Hello there, Sammy!" he shouted. Wilson never opened his mouth to produce anything less than a bellow in keeping with his bovine appearance. He was big built, running to fat through lack of exercise, with a ruddy face and thickly curling black hair. "You come to congratulate me? Back to England, home and beauty, with three years' back pay to blow—that's the life for me." He stretched himself luxuriously.

"I can well imagine," said a soft, cultured voice. Malcolm, the astronomer, was sitting in the corner with a book. He was a tall, thin person, with a pale, hawk-nosed face. His light grey eyes never seemed to focus on any object of such little cosmic importance as a human being.

"Always the cheerful word, that's old Malc," said Wilson, grinning. "I suppose *you* wouldn't like to be going on the next trip?"

"No, as a matter of fact, I wouldn't," said Malcolm. "It will take me at least another four years to complete my work. Time enough then to . . ."

"You make me sick, Malcolm!" There was a hysterical

edge to Chambers' voice as he spoke from the doorway. "You and your drivel about your work. What are you, a machine? Haven't you any human blood in your veins, any longing to get back home and see normal people again?"

"That's right, boy. You tell him," said Wilson. This was the sort of situation he enjoyed. Another good reason why he should be first on the Leave Roster.

Malcolm closed his book firmly. Without a glance at Chambers he walked out of the room in his slow, dignified manner.

"Come and have some coffee, Chambers," said Wilson. "Maybe you'd like to give me a few addresses? I could help your girl friend get ready to welcome you in six months time, eh?"

I gave Wilson a warning look, which he ignored. I knew that Chambers was not at all sure whether or not he still had a girl friend. Chambers walked over and sat between us. He accepted the cup of coffee with a nod and sat staring into it.

"Three years' back pay!" continued Wilson. "That's more money than I'd ever hoped to save in a lifetime.

Do you know what I'm going to do?"

He began to go into details. I got up. I was feeling a little sick. If the fat ox wanted to goad Chambers until the poor devil slit his throat it was no business of mine. The air in the main corridor seemed fresher.

The door of Base H.Q. opened as I was walking past.

"Ah, Samuels! Just the chap I was looking for. The colonel would like a word with you," said Boon, the geologist, a busy little field mouse of a man, with a pale twitching moustache.

The Old Man could have called me anywhere, inside or out of the Base, on the intercom system, but Boon was like that, the helpful type.

"Thanks," I said curtly, and walked through the open door. After three years cooped up together even the slightest gesture that would normally go unnoticed begins to grow on you, until in your less controlled moments your mind would find in it a perfectly valid reason for strangling the offender.

"Good man, Samuels." The Old Man had the sort of voice that always made me

think of roast beef and port wine, deep and throaty, but pleasant to listen to. He gave you the feeling that even if you didn't really believe in all the things he stood for, it was nice to know that there were still people like that around. I could see the shadows in the dark-etched lines on his strong face.

"Would you have a look at the ventilation system in here?" he asked. "Seems to be rather stuffy, don't you think?"

"Yes, sir. I'll check it right away." I walked over and put my head close to the grille. There didn't seem to be much joy, so I started to unscrew the front panel. The colonel went back to the sheaf of reports he had been checking when I came in.

I must have been messing around there for about ten minutes, when there was a knock on the door and Wilson entered. He was more subdued than he had been in the Mess a few minutes before. I wondered for a minute whether something serious had happened between him and Chambers.

"Could I speak to you, colonel?" he said, hesitantly. "It's about my leave."

"Of course, man," said the colonel sharply. "What is it? You should be well satisfied with the arrangements. As I remember, you're first on the list."

"That's right, sir." The big man was fumbling for words, avoiding the Old Man's eyes. "I wanted to know if I could change my turn with Chambers."

"What the devil for?" exploded the Old Man.

"Well . . . I've been talking to him, and he sort of . . . I don't mind waiting another six months after all this time, and I thought that you . . ."

The Old Man was nobody's fool; he could smell something rotten as quickly as the next man. He flipped on the intercom.

"Mr. Chambers report to Base H.Q.—at the double!" he roared. He turned his attention back to the quivering Wilson. "Now, perhaps you would care to tell me what lies behind this sudden burst of altruism?"

"It was Chambers' idea, sir . . ." The big blustering fool was completely un-nerved by the Old Man's anger and spilled the whole story. Chambers had offered to give Wilson practically the whole of his

back pay if the man swopped places with him on the Leave Roster. Money was of little importance to Chambers at this moment, his mind obsessed with the desire to get back to Earth at any price. And Wilson—the little spring that made him tick used greed as its motive power. The extra six months' wait meant nothing to him, if there was a bigger and better debauch at the end of it.

Chambers entered towards the end of this recital. His pale face was oily with sweat and his movements jerky.

The Old Man looked at him. "Well, Chambers, what have you to add to this piece of snivelling conspiracy?"

"I've got to get back, sir!" Chambers' voice was like the sound of a dry-running bearing near the point of disintegration.

"You are under my orders here, remember that," said the Old Man. "No man with an ounce of respect for discipline would contemplate such a transaction as this. The Leave Roster stands as it was drawn up, and there will be no alteration under any circumstances, understand?"

Chambers moved forward, placing his hands on the Old

Man's desk, pleading. "You've got to listen to me, sir. These last three years have done something to me; there are things happening inside my mind, frightening things. If you make me stay here any longer I shall go mad, I know it."

The Old Man rose to his feet. He had no time for weaklings. "Get out of my sight, you self-pitying coward. Do you imagine that you are the only one who wants to go back to Earth?"

Chambers was still for a moment, then his head drooped on his chest, beaten down by the ice-blue rage in the Old Man's eyes. He turned and walked out of the room, followed by Wilson.

As the door closed behind them the Old Man turned and looked across at me. His face was drawn and haggard. "I expect you think I'm a hard-hearted swine," he said quietly.

I made myself busy with the ventilator. What sort of an answer could an engineer's lieutenant make to such a question?

"Do you think it was easy for me to make out that Leave Roster?" he continued. "I've a wife and kids waiting for me at home. It would have

been so easy to put myself at the top of the list. Nobody could have stopped me doing so, but I didn't. Can you understand that, Samuels?"

I felt suddenly embarrassed. I had never heard the Old Man speak like this before. I knew he was not asking for sympathy, but he was feeling the need to justify himself and his actions to a fellow human being; probably for the first time in his life.

"The way I see it, you're in command, sir," I said. "I've no complaints. We all volunteered for this duty, knowing that it would be tough." I hesitated. "But I think you should remember that *Chambers* was not a volunteer."

He breathed in deeply, pulling his big shoulders back. "I am in no danger of forgetting that. He was sent here against my wishes, you know. In a group as small and isolated as ours there can be no such thing as a single, privileged civilian; one such person can ruin the discipline and *esprit de corps* of the whole personnel. Don't you see? I could not put him first on the roster. All of us have been under such constant stress that any favouritism could precipitate resentment

which would endanger the co-ordination of the whole group."

"But he's in bad shape, sir," I said. "He might do something stupid."

"I know, that's the devil of it." The Old Man sat down at his desk. "But I've got to take that chance. The welfare of the Base is of far greater importance than that of one man. He'll be going back on the second ship; that's as much as I dare do for him. The Psyches will be able to straighten him out when he gets back to Earth."

I knew the Old Man was right, but I had the feeling that six months was too long for Chambers to wait. Whilst he knew that Earth was unattainable he had been able to stand it, but to know that a ship was coming at last, and that somebody else would be going back with it. That was a different matter.

I didn't see much of Chambers for the next couple of days. I was working on my own, ironing out the bugs that had developed in the ventilation system, and he was elsewhere in the Base finishing the overhaul on one of the crawlers. He didn't

show up at the Mess, either—at least, not at the times I was there. We'd always been pretty close up to then; working together a lot of the time and talking after duty hours. He was never a very cheerful companion, but we had some things in common. Malcolm and Boon were hardly my cup of tea intellectually, and Wilson's conversation was limited to subjects I preferred not to discuss.

The fat slob was sitting in the Mess as usual. Not so cocky about his leave, now that he looked like spending part of it in the glasshouse.

"What's happened to Chambers?" I asked.

"That rat!" Wilson was chewing greedily on a chocolate bar. "Him and his bright ideas. He was in here this morning before lunch."

"What did he say?" I asked impatiently. "Did he talk about the Leave Roster again?"

Wilson grunted. "He didn't talk to me about anything. Just walked around looking sorry for himself and muttering, all hunched up like a whipped dog. Enough to give you the creeps." He leaned over confidentially. "If you ask me, I think he's going round the bend."

I began to feel guilty about neglecting Chambers. Something told me that a man in his state of mind should not be left too much alone. I walked along to the door of his quarters and knocked. There was no reply. I tried the door and found it was unlocked.

Chambers was not there. I stood looking at the interior of the small room. The walls were covered from floor to ceiling with pictures cut from magazines and books. We all had a few pin-ups hanging around in our quarters; men away from home always do that sort of thing—it's more or less traditional in the service. But these weren't the ordinary run of pin-ups. In the main they were not pictures of people at all, just landscapes and everyday scenes taken back on Earth. Pictures of London predominated—that was Chambers' home town, I remembered. I could imagine him sitting there alone in this room, feeding his great longing on these pictures and at the same time aggravating it beyond endurance.

"What the hell do you think you're doing?"

I turned. Chambers was standing behind me, his eyes staring hotly in a face that

seemed to be carved out of ice.

"I just called to see how you were . . ." I started, but he was not listening to me. He looked past me towards the end of the room. With his lips writhing soundlessly he walked over to the locker that stood by the bed. I noticed that its door was slightly ajar. He closed it firmly, locked it, and placed the key in his pocket.

"Who sent you here to spy on me—the colonel?" he said, turning to face me again.

"Don't be stupid," I said. "You can't go on brooding like this. Try and snap out of it, man. Accept things as they are."

He smiled. It was a frightening thing. "Perhaps I won't have to," he said quietly. Then, with a sudden change of tone: "Now, get out! And don't let me catch you snooping round here again."

I got out, telling myself in future to mind my own damned business.

The next day the Old Man called me to Base H.Q. "The supply ship is on its way, Samuels. I want you to take Wilson and Chambers out in a crawler and re-mark the

landing area. We don't want any recurrence of the M3 business."

I agreed with a shudder. M3 had been one of the first exploratory rockets. Instead of landing on the crater rim with its dangerous jagged rocks as ordered, the pilot had pulled what he thought was a smart move and touched down on the smooth plain. The ship immediately began to sink in the several kilometers deep dust "sea." Panicking, he had tried to blast out again, forgetting his blocked jets. The ship exploded, what wreckage remained soon sinking from sight.

We put on our suits, Wilson complaining bitterly about being forced to do something which entailed physical exertion. Chambers was incommunicative, but I sensed an air of suppressed excitement in his quick movements.

There were still traces of the black marking fluid that had once covered the landing area, but most of it had been obscured by the ever-present pale dust which flowed across the surface of the moon like a liquid due to the forces of thermal agitation. I halted the crawler just outside the area and we strapped containers of the pressurised

fluid to the backs of our suits. We dispersed, each carrying a manually controlled spray, to different parts of the area and commenced our work.

"Make a good job of it, boys." Wilson's voice crackled over the suit radio. "This ship will be carrying an important cargo on her way back."

I ignored him and looked over towards Chambers. He was standing very still, looking up at the globe of Earth which hung huge in the diamond-studded sky. I hadn't the heart to bawl him out, so I just carried on with my spraying. It was a slow, boring job and my thoughts had plenty of time to wander.

It might have been ten or fifteen minutes later when the scream rattled through my helmet speaker and brought me back to reality. I turned to see a suited figure collapsing slowly in the dust, the spray apparatus falling from its hands. There was no sign of the other member of the party.

"Chambers! Wilson! What the devil's happened?" I shouted.

A suited figure appeared from behind a spur of rock and walked towards the fallen man. I headed in the same

direction, the blood hammering in the veins of my neck. By the time I arrived the other was kneeling by the prone figure, examining it. The faces of both were obscured by the darkened plastic of their helmets. Closer now, I could see that the suit of the fallen one was deflated, its air supply gone.

"There's nothing we can do for him." It was Chambers' voice. He pointed to a tiny hole in the breast plate of the suit, then turned the limp body over. There was another hole in the back. A small meteor, travelling at a tremendous velocity, must have passed through the unfortunate man's armour unchecked.

"A chance in a billion," I breathed, with a shudder. "What filthy, rotten luck." We all knew that such a thing was theoretically possible, but up to now nobody had given it a thought, dismissing it as one of those things that never happened to you, like falling off a chair and breaking your neck.

"We'd better get him back to the crawler," said Chambers. We picked up what remained of Wilson, his loudness and his greed gone into the big night.

"The body will be taken back to Earth for burial," said the Old Man. We were all standing in Base H.Q. "That is the least we can do for a man who gave his life so tragically in the execution of his duty."

It seemed strange to talk of Wilson in this way, but that is how things are in the service. Alive, he was a fat slob whom nobody liked, but dead he was the symbol of a duty we all respected. At least, that was the way the Old Man made it sound.

I glanced sideways at Chambers. He was looking at me with something resembling a smile on his thin lips.

"The supply ship will arrive at approximately noon tomorrow, by which time all specialists will have their reports and samples ready to be taken on the return journey. Any questions?" concluded the Old Man.

"And the leave arrangements, sir?" said Boon, voicing the question that was uppermost in all our minds.

"They will stand according to the roster," said the Old Man, turning away to his desk. "The next man on the list will make himself ready to embark. That is all, gentlemen."

We saluted and left the room.

"You made it after all, Chambers," I said, as we walked along the corridor.

"Yes! I did, didn't I?" There was a tense elation, verging on hysteria, behind the words. "My God! What a wonderful thought. No more of this stinking canned air . . . real human beings to talk to . . . freedom!"

I turned away, feeling a little sick to hear him crowing whilst the body of Wilson lay elsewhere in the Base. I wondered how I would have acted under the same circumstances.

"No, don't go, Sammy," he said, with a greater friendliness than he had ever shown before. "I've got to have somebody to talk to or I'll burst. Come along to the Mess with me."

I agreed, reluctantly. He went on, hour after hour, talking about going back to Earth and what he was going to do when he got there. I saw that my feelings were not important to him; he just needed a sounding board, anybody to listen to his chatter as the tension that had been building up so long poured out of him.

The supply ship arrived right on the dot. I ran the Old Man out in a crawler to pick up the crew. There were two of them; a brisk, efficient little captain and a starry-eyed blond lieutenant who looked too young to be doing anything but playing at spacemen.

When we arrived back at Base, the captain produced a sealed folder. He and the Old Man retired to his private quarters. I was left as a kind of nursemaid-cum-guide to show the lieutenant round the Base.

"You chaps have done a marvellous job up here," he said, admiringly.

Just for the good of his soul I tried to summon up some of the enthusiasm that had been drained out of me by the long, monotonously routine years—but it tasted bitter, and dusty.

We had been through everything from ventilation to sewage reconversion in grinding detail, when the intercom burst into life.

"All personnel report immediately to Base H.Q. . . . All personnel report immediately . . ."

We made it at the double. The way I was panting to keep up with the young lieutenant

showed me how out of condition life under low gravity conditions had made me. The rest of them were already there, standing round the Old Man and the captain.

The Old Man referred to the sheaf of papers in his hand and spoke: "Well, gentlemen, I have called you all together to tell you that there has been a slight change of plan since our talk yesterday. Captain Oakes has brought with him confidential orders which I have verified by radio with home base on Earth."

I could feel the ripple of tension which ran through the room. Chambers' eyes were closed, his lips moving as if in prayer.

"First," continued the Old Man. "Both Captain Oakes and Lieutenant Groves have come here not only as crew. They will be staying here as replacements."

I looked at the young lieutenant. He grinned back at me like a kid who has just been given the biggest helping of ice cream.

"Second; Captain Oakes will be temporarily in command of the Base. I trust you will give him all the co-operation which you have shown towards me."

"You're leaving, sir?" I said. Things were happening too fast. Taking the Old Man away would be like pulling the props out from under us.

"Only for a short time," he answered. "It seems that the Government wish me to appear before the U.N. committee and give them an outline of the work we have been doing here. The future of the Base may depend on that interview. It is a responsibility which I would rather not have undertaken, but those are the orders."

He looked us all over, very slowly. "There are further orders, which affect leave arrangements." There was a pause, and I could hear the rasp of breath over the throb of the ventilation pumps. "I am to pilot the ship on its return journey, taking with me all the available data, and the body of Wilson. The rest of you will *all* go back to Earth for an extended leave on the next supply ship."

Chambers moved a pace forward, his body arched like a spring.

"When will that be?" His voice crackled from a dry throat.

The Old Man looked at him steadily. The fact that the future of the Base depended

solely upon his testimony must have killed any feeling of pleasure he might have at returning to Earth.

"Provisionally, in six months time," he said.

"Six months!" Chambers' voice trembled on the edge of a scream. "How do we know that's true? It might be another three years; you wouldn't tell us."

"That is all, gentlemen." The Old Man's face was stony.

"They can't do this! What sort of fools do they take us for?" Chambers seemed to have lost all control.

I nodded to the young lieutenant. We closed in on either side of Chambers and practically carried him out of the room.

Down in the sick bay we pumped sedatives into him and gradually talked him back into some kind of sanity.

Blastoff was scheduled for the following day, so there was plenty for me to do, ferrying out crates of samples and bales of reports and stowing them in the hold of the supply ship. It was a job that had to be done carefully. If a crate came adrift under the stress of acceleration it could do a lot of damage.

I was working against the clock, so the Old Man was to be brought out by Chambers in the other crawler. He seemed to have calmed down all right now, but he would have been no good for a job like the one I was doing.

I had just stowed the last crate and was heading towards the main port when I heard a voice through my suit radio.

"Put that thing down, you damned fool! What do you think you're doing?" It was the Old Man, talking to someone outside the ship.

"I'm going to kill you." The voice was cold and flat. "Do you think I'm going to let you go back to Earth and leave me to rot here? That's the way you'd planned it, you stiff-necked tin soldier. You've always hated me; now it's my turn. I can pilot that ship."

"You're mad, you would never get away with it," said the Old Man.

Chambers laughed, a short metallic sound. "Oh, but you're wrong. I have once, already...remember Wilson?"

I pulled a big wrench out of a magnetic clip on the wall and walked slowly towards the port. Peering cautiously round the corner, I saw two

suited figures standing by the crawler, about ten feet below me.

The one with his back towards me was holding a small needler. The sort of gun which, used at full power, could penetrate four inches of armoured steel; *or pass right through a spacesuit, leaving nothing but a small hole.*

"Not twice," the Old Man was saying. "It would break all the laws of probability. An inquiry back on Earth would soon uncover the true facts."

I knew the Old Man was just stalling for time, hoping; Chambers was beyond the reach of logical argument. A lot of things were going on in my mind in that long moment. I remembered the way Chambers had looked at me that time he found me in his quarters; the way he had rushed across to his locker; and how he had chattered away after Wilson's death, his feeling of power loosening his tongue.

"Not if I go back to another part of Earth," Chambers said. "There are plenty of nations back there who would be prepared to pay a fortune for this ship and the information it contains."

I launched myself out of the port, the wrench held ready. That was the longest ten feet I ever fell. I was sure that Chambers must turn round, look upwards and pull that trigger.

But he never knew a thing. The wrench crashed down on his helmet, shattering it as if it had been ordinary, brittle glass. A bubbling, blood-choked scream sounded briefly over the suit radio, picked up by his throat mike, and he folded into the dust under the impact of my body.

The Old Man helped me to my feet. "Thank you, Samuels," he said, reaching out an armoured hand. We stood there for a moment, under the big greeny globe that never sets, then he said: "There's no need to talk about this."

That was all; not an order, not a question—but I understood. We picked up the thing that had been Chambers and carried it aboard the ship, stowing it beside the body of Wilson.

I boarded the crawler and drove off to a safe distance to watch the blastoff. I watched until the supply ship's drive dwindled to a small point of

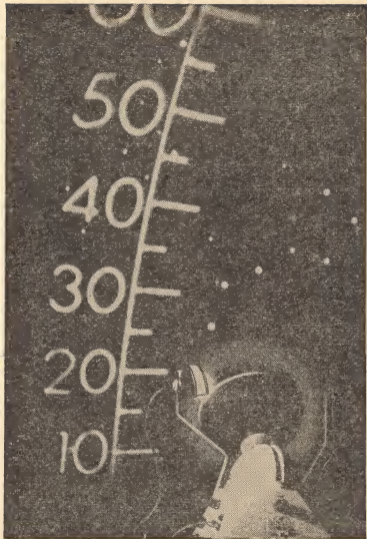
light, indistinguishable from the stars.

Chambers was going back to Earth, and Wilson. When they got there, I knew what the Old Man would arrange. There would be a funeral for the two of them. All the pomp and glory of full military honours, with the Old Man marching at the head of the procession in his full-dress uniform.

And he was right. Chambers could have been any one of us. You can't just dismiss the man as a coward or a murderer. He was a man who did his duty to the best of his ability until he cracked up, and it just so happened that his mind went before his body. There's no need to tell the world the way he died; goddam me if I sound mealy-mouthed. I'm not used to saying this kind of thing—none of us are. We're the stiff upper lip boys.

In his own way, Chambers died for the Moon Base. That's what counts. They can talk all they like on that blasted U.N. committee, but whatever they say or do, they can never change the fact that we got here first.

And, by God, we'll stay!



Toys can also provide—

Educational Entertainment

THE TECHNOLOGY OF A race can usually be shrewdly assessed by the playthings of the children; the higher the cultural technology, the more scientific will those playthings be, and it is interesting to see how science has influenced the "toys" of our own culture. Such toys, far from being merely amusing, have a high educational value, so that the young, quite unconsciously, gain new concepts and a firmer understanding of the universe in which they live.

Probably the most immediately educational additions to the field are the Spitz School and Junior Planetariums. The School Planetarium, while costing no more than the equivalent of £50, is a scientific tool in its own right and, for the teaching of astronomy, cannot be equalled. Supplied with a ten-foot diameter metal and fabric dome which folds up when not in use, the School Planetarium comes complete with adjustable table, meridian projector, arrow pointer for the teacher to illustrate the lesson, a rheostat control to brighten or dim the "stars"

and a dome illuminator to provide sunset and sunrise effects.

The power-driven projector provides daily motion equivalent to one complete day in four minutes, and with the lights off over 300 stars and constellations can be projected accurately on the "dome" to simulate Latitude and time of year if so desired. The Harmonic Reed Corpora-





tion, which manufactures the Spitz School Planetarium, also produce the "Sky Zoo," a device which can project constellation animals and mythological figures as seen on the old celestial globes.

The same company also produce the Spitz Junior Planetarium which, at the equivalent price of less than £6, is something every astronomical or space-minded youngster would like to possess. This instrument, despite its low cost, is capable of projecting 40 constellations or 300 stars, and is provided with an arrow indicator, a device which projects a thin beam of light. The planetarium and indicator are made of tough, unbreakable plastic in attractive colours. The unit is easily operatable, the sole requirements being a dark room and a supply of ordinary house current.

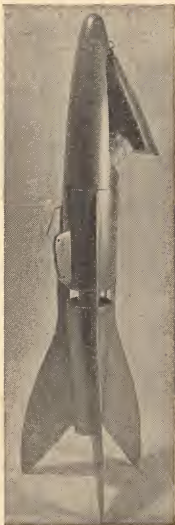
It is to be regretted that, at present, the unit is not obtainable in the United Kingdom.

Different, but just as interesting, and readily obtainable, is the Dan Dare Spaceship, manufactured by Wilmot, Mansour & Co., Ltd., and obtainable in most stores at 47s. 6d. This is not, by any means, a "toy." It is an

actual working model of a spaceship, the rocket thrust being provided by a Jetex motor, and has been designed by aeronautical experts with particular reference to realism.

The model is a self-build kit and contains everything needed to construct both the ship itself and the launching ramp. Also included is the parachute, rocket motor and fuel for same. All the purchaser has to provide is some patience, time and paints to suit his personal colour scheme, and this, particularly, is where the educational value is strongest. Aside from the manual dexterity any such model-making inevitably develops, the engineering problems facing the builders of the first real spaceships are emphasised by the actual construction methods employed in the model and the realism is further accentuated by the performance of the finished product.

The model is launched from a ramp and overcomes gravitational pull, not by means of aerofoils, but by the thrust of its motor which, at the commencement of flight, is assisted by a spring incorporated in the ramp. This spring is the model equivalent of the "booster" rockets which will



most probably be used on the real thing.

The model, which has an overall length of over 13 inches, rises vertically to an altitude of more than 150 feet in a spectacular thrust of power. Equally spectacular is the automatic blossoming of the concealed nylon parachute at maximum altitude, to return the ship safely earthwards.

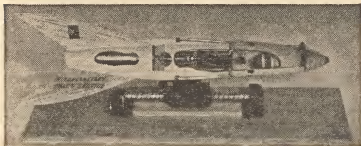
The ship, naturally, can be used again and again, and it seems logical to assume that, with the rising interest in space flight, youngsters, and adults, may turn from the "old fashioned" model aircraft to the newer and more fascinating field of rocket-powered spaceships. In any case, the building and launching of such models will familiarise the users with the problems to be met with above the upper layers of the atmosphere and the means

taken to overcome them.

Different and yet, in its own way, just as educating, is Astron, the space game manufactured by John Waddington Ltd., at 25s. This is a table game which can be played in comfort by up to six persons at a time, and the manufacturers have managed to incorporate many aspects of space flight in their product.

The idea is for the players to land their "spaceships" on various space stations and so score points. These points are on a sliding scale so that the first player to land scores the highest. Points are lost through various hazards, and even the ship itself may be so forfeited.

While the concept of such a game may not be new, yet the makers have solved the apparently impossible problem of compressing most of the Solar System down to table-size by the innovation



AUTHENTIC SCIENCE FICTION

of a moving board which, while permitting a greater playing area, adds realism by permitting only a portion of the playing area to be seen at one time.

The game is exciting in that it permits individual competition by means of a limited, and variable, manoeuvrability to each player's "spaceship." This is done by the introduction of instruction

cards which may be played as desired.

Waddington's are to be commended in that they have adhered as far as possible to known astronomical phenomena, and Astron, a well-produced and ingenious game, while primarily entertaining, does have certain educational aspects which will familiarise the players with some of the planets of the Solar System.



There is more than one man like—

Dr. Blaise | BY ROBERT LAWSON

WE ARE NOT GODS, BUT sometimes certain gifted members of our species get very close to tapping the power sources of the Deity. Such a man was Dr. Julius Blaise, probably the most brilliant biologist of all time.

Charles Darwin postulated evolution. Dr. Blaise proved it by putting it into reverse.

"It was that delightful little genus of Ascidians, *Clavellina*," he said, "that first gave me the idea."

Clavellina, it should be explained for the benefit of those who may not know, is a marine creature exhibiting various characteristics which show it to be an offshoot of the vertebrate stock. Beautifully translucent, it reveals minute blood vessels, heart, thorax, breathing system and reproductive organs. It is especially interesting because when it is placed in unchanged water for any length of time, as a result of combined

starvation and auto-intoxication, it gradually shrinks in upon itself, its breathing slits or gills cease to function, its organs become denser until, finally, as the result of a retrogressive process, it is no more than a small opaque ball less than a fifth of its original size and bearing no resemblance whatsoever to a fully-grown Ascidian. And yet it does not die—it merely continues to exist in another and altogether more rudimentary form. It is, in fact, a complete example of involution as opposed to evolution.

"I have worked on the assumption that what is possible to one species is possible to all," said Dr. Blaise as he proceeded to demonstrate to a startled scientific world how, by an unspecified system of serum injection, it was the easiest thing in the world to transform a fully-grown, robust looking frog into the most nondescript and insignificant of tadpoles.

"Miraculous!" shrieked the headlines of the daily newspapers. But upon being asked by a sensation-hungry journalist as to whether the same process of reversion could be applied to the human species, Dr. Blaise remained politely non-committal.

That was all that the larger world knew about Dr. Blaise. The private lives of scientists are normally less interesting than those of film stars, and whilst the domestic secrets of an ageing Garbo continued to be speculated upon, Dr. Blaise was soon forgotten. But there was a grim secret behind the everyday facade of this man who had tapped the power of the Gods. A secret more subtle in its horror than any fiction hatched in the brain of an Edgar Allen Poe. And, whilst we are on the subject of Poe, was it not he who, in his excellent story "The Cask of Amontillado" put into the mouth of his chief protagonist, Montresor, the irrefutable axiom that "A wrong is unredressed when retribution

overtakes its redresser. It is equally unredressed when the avenger fails to make himself felt as such to him who has done the wrong." An axiom of which Dr. Blaise was well aware—aware, too, as we shall see, that it was capable of extension.

Hatred is perhaps a physical reaction as inevitable and as irrevocable as a blush, but the motive of revenge is both illogical and ignoble. Nevertheless, like Montresor, Dr. Blaise, a man of high intellect and high ideals, had long nurtured ideas of revenge upon one who posed as a friend. A man younger than himself, an aviator and a popular hero, but the sort of man who commits the unpardonable crime of seducing his friend's wife.

Dr. Blaise was forty-five at the time; a small man with a large, prematurely balding head. A rather insignificant person perhaps if you took a casual glance at him, although if you took a second glance you would not fail to be held

by his eyes—the pale grey abstract eyes of genius. His Russian-born wife, Varya, was fifteen years younger. A dark beautiful woman, restless, impulsive, worldly. They were an ill-assorted pair, but Dr. Blaise had loved his wife as much as any man could until she placed upon him the shameful horns of cuckoldom.

Paul Stock, the man responsible, was some ten years younger than Dr. Blaise. As a youth of twenty he had made a name for himself as a "Battle of Britain" fighter-pilot, and at the age of twenty-five had reached the relatively exalted rank of Group Captain. After the war he continued to fly as a test pilot and soon began to "hit the headlines" as a breaker of sound barriers and establisher of long-distance speed records. During one such flight he made a forced landing in a remote part of the Amazon country. For some time nothing was heard of him and he was presumed dead. Eventually, however,

accompanied by a flurry of banner headlines, he showed up again and hinted mysteriously at strange adventures with outlandish native tribes. As a token of this exploit he revealed a peculiar tattoo mark on his right forearm—a red circle with an arrow protruding through it. This meaningless symbol became a familiar sight in country clubs and the more exclusive types of hotel bar.

Stock was a large, physically strong man, handsome in a heavily masculine way, and with his fame and the air of mystery with which he liked to surround himself, undoubtedly attractive to certain types of women. He had that sort of keen intelligence which, paradoxically, allied to a limited imagination, makes it possible for a man to become an ace flyer. It no more occurred to him that it was dangerous to meddle with people's emotions than to fly jet aircraft at supersonic speeds. At the very beginning of their clan-

destine affair Varya was constantly reproaching him for the open recklessness of his behaviour. He made little attempt to conceal his fascination for her, and compelled her to face risks which must have been extremely nerve-wracking for any woman who wished to conceal her unfaithfulness from her husband. To such reproaches he would invariably reply: "Don't worry, my dear. That absent-minded Professor will never know a thing. He's got his mind permanently buried in a test-tube."

But, of course, Dr. Blaise knew almost from the outset, and never ceased to nurture his project of revenge.

It was about a year after Dr. Blaise had so astonishingly proved the possibility of induced evolution that Paul Stock disappeared for the second time, but on this occasion it was not as a result of one of his spectacular flights; on the contrary, it was from the heart of the teeming capital.

Not unsurprisingly, for some months no move was made to check his whereabouts. His only living relative, a maiden aunt he was in the habit of visiting once or twice a year, had received a rather long but vague telegram, in which he stated that he might have to go to South America, and that he might not be able to see her for some time. But eventually, having received no word from him for nine months, this elderly lady became perturbed and notified the police. The usual routine action for tracing missing persons was set in motion, and very soon investigations established the fact that the last person to have seen him was Dr. Blaise.

The doctor lived in the Holland Park area in a large mansion backed by extensive grounds—not far, in fact, from the noble ruins of historic Holland Park House. It was to this mansion that the investigating police detectives repaired to obtain the doctor's views on the matter.

They found him most co-operative.

"Mr. Stock," he said, "was a very old friend of both myself and my wife, and we are most anxious to give any help we can."

"So far as we can trace," said the detective-sergeant in charge, a rather stout individual not far short of retiring age, "you were the last person to have seen him before his disappearance."

"Indeed," said Dr. Blaise, raising his eyebrows. "I was not aware of that."

"Perhaps you would like to make a short statement about what took place on that occasion?" said the detective-sergeant.

"By all means," said Dr. Blaise. "I cannot remember the exact date—it was about eight or nine months ago. He rang me one afternoon and said that as he was in town could he come along and have a chat with me."

"Did he want to see you about anything in particular?"

"No. Nothing concerning

me personally. He did mention that he might not have another opportunity of seeing me for some time as there was some possibility that he might have to go to South America."

"Did he give any reason for this?"

"No. I didn't press him for details. The whole business was enshrouded in mystery—but that was just like him."

"What time did he arrive?"

"About three in the afternoon, as far as I can remember."

"Did anyone see him arrive?"

"Yes. My parlour maid. She let him in."

"Did she see him go?"

"No. I don't think so. I saw him to the door myself."

"What time would that be?"

"Oh—some time after 4 p.m. I should say. We had a couple of drinks. He stayed for about an hour."

"I see."

The plump detective-sergeant stroked his chin re-

flectively. He seemed to have exhausted his repertoire of possible questions and a slightly awkward silence ensued. It was broken by the doctor.

"Perhaps you would like to search the house," he said. "I need hardly say that my conscience is absolutely clear. Mr. Stock is a very dear friend, and nobody could be further than myself from seeking to do him harm, but, of course, I realise that you police officers must consider everyone as a possible suspect if you think there has been any suggestion of foul play."

"Well, sir, I hardly think that would be necessary—not at this stage, at least," said the detective-sergeant with a slight air of embarrassment.

"But I insist," said Dr. Blaise. "I am sure you will feel that your job, so far as I am concerned, has been done thoroughly if you do so."

The detective-sergeant looked at his young assistant as if mutely seeking his opinion. But that young man

merely shrugged his shoulders. The detective-sergeant pondered for a few moments and then said: "Well, perhaps we might take a quick look around. I'd also like to have a word with that parlour maid of yours."

"By all means," said Dr. Blaise suavely. "Come this way."

The two police officers, after questioning the parlour maid, searched the mansion in a rather half-hearted manner. They did not expect to find anything which would help them in their investigations and before they had finished, the detective-sergeant, an old hand at such routine manoeuvres, had begun to show visible signs of boredom. His interest, however, began to perk up somewhat when the Doctor took them down to his worksheds, which lay at the bottom of the adjoining grounds.

One of these sheds had been converted into a laboratory and was of little interest to a layman, containing only work

benches, chemical apparatus, test-tubes, beakers, phials, microscopes and all the usual paraphernalia of bio-chemical and biological research. The second shed, however, housed the doctor's private menagerie, and was a source of great interest and amusement to the two officers. There was an aquarium containing a rich and highly exotic variety of marine creatures. There were, of course, the inevitable mice, rats and guinea pigs, but there were also several rather loathsome looking reptiles, and in addition there were two large cages, the first containing four small and particularly lively monkeys, and the second two male chimpanzees.

It was clear to the two detectives that neither of these sheds would yield any secret of a sinister nature. The floors were of cement, the walls plain wooden planking, and the ceiling corrugated aluminium. The doctor's menagerie, on the other hand, offered some light relief from

what would have otherwise been a completely boring afternoon, and when the doctor released two of the monkeys they roared with laughter at their antics as they scampered about the shed, leaping from the work bench to the doctor's shoulder, and from thence to a small trapeze suspended from the roof, presumably for just that purpose.

When the monkeys had been restored to their cage the three men turned their attention to the two chimpanzees. One of these anthropoid creatures sat with its front paws dangling outside the bars of the cage. It was perfectly motionless and showed not the slightest interest as they approached. The expression in its eyes was one of mournful indifference. But the other, a somewhat larger creature, showed every indication of extreme resentment at their presence. In particular its animosity seemed to be directed towards the doctor. It snarled and gibbered at him,

baring its enormous white teeth, and as he brushed against the cage tried to grab him by the sleeve of his coat.

"What's biting that little fellow?" said the detective-sergeant good humouredly.

"Oh, don't take any notice of Casanova's tantrums," said the doctor airily. "He hasn't long been out of Africa and I imagine he objects to being confined. He'll settle down. They all do in time—as you can see from his stable companion, Napoleon, who has adopted—shall we say—a more philosophical attitude."

A half an hour later, as the two police officers made their way back to their headquarters, the younger said: "Do you think the doc maltreats those animals, Sarge? That chimp certainly seemed to have it in for him."

"No, I shouldn't think so," replied the plethoric detective-sergeant. "He strikes me as the type that wouldn't hurt a fly—besides, if he'd maltreated it the brute would be more likely to cower and

cringe away than go for him."

A year passed by and still there were no signs of the whereabouts of Paul Stock. Public interest, which had flared for a while, had by now almost completely waned. The police file, it is true, still remained open, as it always must in the case of missing persons who are not traced, but official activity by now was practically nil.

As for Varya, the doctor's wife, it would not be easy to describe the agonies of mind through which she had passed. Still believing that the doctor was unaware of her clandestine liaison with Stock, she had had to struggle to preserve an outwardly natural mien, striving to present no more concern in the matter than would be expected from a woman to whom the missing man was merely a family friend. But there were times when she gave way to the most terrible misgivings. Times when she thought she could discern, whenever the conversation touched upon

the disappearance of her lover, a queer, half-mocking expression in the doctor's usually abstract eyes. Had he known all along of their guilt? Was he in some mysterious way connected with Paul Stock's long silence? Under the knife of such apprehensions she struggled—sometimes vainly it seemed to her—to preserve the outward mien of a model wife and a carefree, contented woman.

The climax came one evening in the early summer of that year. It was precipitated by Varya's ultimate breakdown under the long-drawn strain—a breakdown in which she confessed everything to the doctor, declaring in a dramatic, typically Slavonic manner that she loved Paul Stock, that life without him was unendurable, and that even if it meant "searching to the four corners of the earth" she intended to quit forthwith and go to him.

With the mocking expression on his face now completely undisguised, the doctor

sat and listened calmly to her impassioned outburst. When she had finished he said:

"It is possible you still imagine that all this comes as a surprise to me. On the contrary, I have known of your infidelity right from the very outset, and I have been wondering just how long you were going to keep up this stupid pretence. As for your—shall we say—rather dramatic statement that you intend to search for your lover to the four corners of the earth, I believe I can save you the trouble. Come with me."

Dr. Blaise arose and made for the french windows leading to the grounds of his mansion, but Varya had a surge of apprehension which held her temporarily paralysed and stood irresolute and motionless. Half-turning and seeing her hesitancy, the doctor paused on the threshold of the french window and said: "Come, my dear, you have no need to be afraid. Surely you don't think I intend to harm you? You

must know by now that any sort of bloodshed or violence is abhorrent to me."

In spite of her misgivings she still believed that, and curiosity, too, was beginning to get the upper hand, so that, although she felt herself trembling in every limb, she followed him into the grounds. Wordlessly, he led her to the shed that housed his menagerie.

As he stood and unlocked the door, he said: "You may not believe it, but I think I have quite a gift for reading people's thoughts. I could tell by your behaviour at breakfast that you would speak your mind this evening. Please step inside. You have absolutely nothing to fear."

It was still twilight in the grounds, but as his wife stepped past him into the darkening shed, Dr. Blaise switched on the electric light to enable her to see quite clearly. The scene inside was in no way out of the usual. Most of the animals were sleeping, but several of the

monkeys stirred, and one of them began to chatter and leap about.

Selecting another key from the bunch he held on a ring, the doctor crossed to the cage which contained the two chimpanzees and began to unlock it. Mystified, but curious in spite of her increasing apprehension, Varya came up beside him.

One of the chimpanzees was sitting upright in a far corner of the cage staring at them apathetically, but the other, the larger of the two, lay stretched out on the floor completely motionless. Varya, in a voice which had dropped almost to a whisper, said: "What's the matter with it? Is it dead?"

"Oh, good gracious, no," replied the doctor. "Merely in a deep sleep—a drug-induced sleep. Within an hour, or possibly less, it will be capable of being awakened to full consciousness."

He put his hands under the inert creature and heaved it over so that it was lying flat

on its back. Then he crossed to his work bench and, from a drawer, extracted a pair of scissors and a small safety razor. He returned to the chimpanzee, and, picking up its front right paw, began briskly clipping away its fur at a distance of some three or four inches above. Open-mouthed, but curious in spite of a growing inclination to take to her heels, Varya stood close to the bars of the cage and watched.

"Now look closely," said Dr. Blaise. "Soon you will see something very interesting."

He had now clipped away the animal's fur until there was a patch about two inches in diameter of close stubble. Then he took the safety razor and carefully began to shave off the stubble.

By now Varya had become convinced that he was insane. What else could such seemingly irrelevant behaviour indicate? A course of action began to formulate in her mind. She would humour him. He seemed harmless

enough so far. Then suddenly her attention became rivetted to the sleeping ape, and her mind was bereft of everything save a sense of unspeakable horror . . .

Upon the creature's forelimb there had emerged shrunken and blurred, but nevertheless recognisable, a familiar tattoo mark—a crimson circle with an arrow protruding through it.

His work completed, the doctor let the ape's paw fall to the floor with a soft thud. The creature sighed heavily in its sleep and rolled over on to its side.

"Behold, madam, your lover," said Dr. Blaise. Then he added, with a mocking smile on his lips, "Or rather—shall we say—what he has become."

But his wife made no reply, and he knew from the expression on her face that his revenge was now complete in all the essentials.

Even Montresor had been surpassed.

He was just a poor little—

WAIF ASTRAY

by

JOHN KIPPAX

NOT UNTIL HE WAS eleven years old did Billy Fineday think of calling on the small brown men; until then he had found his command of the arts of convincement sufficient protection.

The folks of Little Corinth always knew that he was a queer kid; shy, you'd only to look at him . . . he was small for his age, with a strong nose, large ears and lank dark hair. His eyes were mobile and expressive, and his skin took the sun easier than that of other kids. His Aunt Emma would look at him sometimes and speak with a rising anger.

"Where'd you *git* that face, Billy Fineday? Wa'n't never a face in our family like that 'fore I set eyes on you."

"You *know*, ant; when the fire happened over at Jellingsville I was the only one they rescued."

"Ah—if we'd ha' been friendly, we should ha' seen you 'fore that fire, then we should ha' knowed. Sis Jess was like me, and Rube Fineday was a big man, too; tain't natural folks such as they should have a little skinny like you."

Jeb Vogelsang spoke from behind his paper.

"Could ha' bin a mite siz up in the flames 'fore he was rescued."

His wife turned on him with scorn.

"Siz up! Our Jess wouldn't—"

Jeb was tart.

"Considering you quarrelled and never visited, you couldn't be sure of what she was doin'."

Billy, no longer the focus of attention, began to steal from the room as Emma's indignation began to make her quiver.

"Are you implying——" she demanded, and her voice had the quality of the buzz saw in Ed Harrison's back yard, "—are you implying, you nasty little trader man Jeb Vogelsang, that my dear departed sister went a hay-loftin'——"

"Ain't implying nothing!" snapped Jeb. "All I'm a saying is that if you never went over to see your sister, how the tarnation blazes can you know what she did, or what kids she had?"

"When she had a kid," said Emma sullenly, "she writ, just to let us know."

Jeb looked up from an article headed "President Again Threatened." He barked: "And she writ to tell you her latest was a boy named Billy!"

He threw down his paper. He rose and went to the door.

"Reckon I'll take a walk. Hey, where did Billy go?"

"He snuck out. I'll tan the daylight out'n him, 'f he stays out all night again. Way he steals out——"

"Gramps Marson says he got Indian blood in him."

"Gramps Marson's a old fool!"

The last words were hurled at a swiftly closing door; Jeb

preferred the bar when conversation started to go this way. The bar saw quite a lot of him.

Billy made his practised way over the tumble of garden lots, a dark skipping shape in the moonlight. He was into and out of Ed Harrison's yard before the dog could do more than give a couple of preliminary growls. Once the town was behind him he struck the road again, then dodged round the clump of trees and into the illkept garden, up to the dingy frame house. He knocked, then jiggled a loose board which his foot found to play with as he waited, nursing the bundle of food inside his shirt. Then the door creaked open, and Sam Leary stood there, wearing his old brown shirt and his faded jeans.

"Hi Billy." He paused. "Uncle Mike ain't in."

"Swell." Billy saw Sam hesitate. "Then what you waitin' for? They'll bring him in like always, hah?" He dived his hand in at his chest. "See, I'm taking up bread and sausage——"

His voice was winning. A spell, a little spell. Sam's hesitation vanished, as Billy had known it vanish before,

"O.K." said Sam. "Minute. I'll get my zipper."

When Sam was ready, they set off at a brisk pace up the dirt road. An owl hooted, a rabbit rustled. After the rocks had become more numerous and the path narrower and steeper, they passed through a little grove of oaks, and then turned left and up to the brow of the hill. Then they slipped and skidded down the slope, hopped like goats from toe hold to toe hold. Then with a final leap they landed on the platform of the cave which topped the precipitous side of the old quarry.

Sam looked out over to Little Corinth.

"Gee," he said, "it's swell to be free."

Billy pushed aside the canvas at the cave mouth and his face seemed old and twisted in the moonlight.

"Free?" he said. "That's what *they* think"

Jeb Vogelsang was also a *general dealer*. His trade paid off as far as Billy was concerned. The cave, which ran back into the rock for about twenty feet, was furnished with goods purloined from uncle's store. Chief items included two camp beds, a

small table, three chairs and an oil lamp.

"Finished, Sam?"

Sam wiped round his plate with a hunk of bread and stuffed the lot into his mouth.

"Yup. Wash up?"

"Morning'll do." Billy's thin face looked sharper than ever in the glow of the lamp. "Gotta stay tonight. Important. 'S why I wanted you here—to help——"

"Help?"

What *was* there deep inside Billy which sometimes rose to the surface?

"Help with what? Why?"

Then Billy told him. At first Sam wanted to jeer, then he became seriously attentive, and finally, at the end of the tale, he was looking quite alarmed.

"Gramps Marson said you got Indian blood. That's magic stuff you just told me."

Billy leaped to his feet and gripped Sam by the shoulders.

"I gotta have a friend on this! 'F I told them down there"—he gestured at the curtain of canvas beyond which lay the sleeping little town—"they'd be after me like I was mad. I ain't mad! It happens, I tell yer. It started as dreams, just a voice. Then it was shape, a

shape of a little brown man. Now he visits me, see? He comes and he talks. Says I got a job to do for them, because they got limits . . . *Damn!*" Billy almost squealed. "How could I of made it up?"

His voice dropped to a pleading.

"Sam, be a pal, stay and see if it ain't right. Tell you what," he added, "when Mr. Dirim comes tonight, I'll ask him to leave *proof* for the morning." He was coaxing now. "Hah? Hah, Sam?"

Sam said: "Fairy folk." The golden light of the lamp gave him the colour he lacked.

"Oh *no*, Sam. This little guy's *real*. You stay. See. There's the bed, and we got food, and your uncle Mike sleeps till about noon Sunday, so——"

Billy blew out the light. Sam gasped. Billy said, pleading still: "Take the canvas down; the moonlight's so good."

A long, long pause; then there was a movement, and the next moment Sam was taking down the canvas and rolling it up.

"Don't forget to wake me when he comes."

"You'll wake," said Billy.

The morning sun was probing into the cave when Billy rose and crossed to his sleeping companion, with something dark and cylindrical in his hand. He shook Sam awake.

Sam sat up.

"Hah!" He rubbed his eyes and stared owlishly at Billy. Then he grinned.

"See!" he said, and his voice had a jeering note. "See—I said he wouldn't come; your Mr. Dirim!"

Billy leaped in anger, his face contorted, his mouth working.

"You trying to send me crazy? I woke you up long about half past two, soon as he come. I ast him if I was to wake you, and he said yes, you was good for having proof, *and I woke you and you sat and listened!*" His voice was high and frenzied. "He told us 'bout how he could make people smaller and then big again, and how Dirims had to have me do things for them till they was Earthmen!" Billy had Sam by the throat, but Sam threw off the clawing fingers of the other and then stood ready to defend himself. He, too, was angry now.

"Loony Indian! What did I ast him, then?"

Billy dropped his voice; his whole body was shaking; he was aghast at this perfidy. He held out the cylindrical object. "Said you wanted proof—when he told you about us, he said for us to look out from here at our back gardens this morning. You take this telescope now and you'll see."

Sam took it. Disbelief was there still.

"He brought this?" It was a fine telescope, indeed, leathercovered, brass wherever brass could be, and it weighed importantly. "Reckon you could ha' brought it and never told me."

"HE BROUGHT IT!" snarled Billy. He extended the instrument and put it to his eye. The gardens of Little Corinth leaped to view with a flat, supermagnified clarity. He handed it to Sam. "Go on, you watch—like he said. Your back garden and mine. I'll get breakfast."

Sam, still unwilling, settled himself down on the ledge to watch.

Breakfast soon began to smell good. Tinned bacon, and beans, and coffee and bread.

"You want to eat first, Sam? Go on, help yourself."

Unopposed, Billy was quite calm now. He came out on to the ledge and took the telescope and Sam went to find his breakfast.

The scrape of a fork on a plate and noisy drinking sounds were all that could be heard for a few minutes. Then Billy, without removing the telescope from his eye, said: "Hey, your uncle Mike ain't never been to bed. Take a look at the back porch."

Munching, Sam came and took the glass, and crammed it to his eye. Billy's words throbbed in him; see somebody go smaller, see somebody go smaller. Magic!

"Right," he said. "I can see him lying there; done it before. Couldn't get up the steps, I guess." He sat for a few moments and then said: "Hey."

Billy, who had been eating, came up with a piece of bacon on his bread and said: "Is it startin'?"

Sam lowered the glass for a second, but had it put back to his eye with a sharp shove.

"Is what happening?"

"What Mr. Dirim said. He's with your uncle now, ain't he?"

Sam gave a squeal as Billy's grip closed on his

wrist. It seemed a very strong grip for a little fellow. Sam had never heard of auto suggestion.

"Your uncle's going smaller, ain't he?"

Billy had known for long enough how to tell 'em and make 'em believe. Sam made a hoarse noise which could have been an affirmative. He was trembling—and Billy loved it.

"And now he's that small that Mr. Dirim just picked him up and put him in a bag, didn't he?"

Sam looked hard, hard, harder than ever. Yes!

"Yeh, yeh, yeh!" His lips were working. "Now that Dirim is going away." His voice was high and screechy. "He's going away!"

"And," said Billy, with quiet satisfaction, "he ain't walking and he ain't flyin'. He's just going."

Sam lowered the glass. He was trembling violently.

"Believe it now?" asked Billy.

Sam nodded, fascinated. Billy was swelling with pride. If there was no self-expression to be found in the cramping confines of the Vogelsang household, he could find it here.

"Says I ain't really one of *them*; says there ain't no harm to be done to folks I like. Reckon he's just being grand and fair, and took my troubles away."

"Sure he ain't been threatening the President of the U.S.A.?" asked Sam.

"Threaten? Naw! He's my pal. Hey, what threats?"

"Said on the video President had been threatened."

"Wouldn't have nothing to do with *that*." He hitched forward and sat down on the ledge, and took the glass.

"But where's uncle Mike gone?" Sam wanted to know.

"Ain't you glad he's gone?"

Sam was white. He got up and walked the ledge, then he seemed to make up his mind, and he came to where Billy was. "Yeah," he said, "I'm glad—and I believe you now." He stood by Billy as the latter sat with the glass to his eye.

"What else he say to you last night?"

Billy was filled with quiet satisfaction. "He said I was to be the in-instrument—the signal for the beginning of the change. I'm a friend of his, see—so're you if you act right. Shaddap! Jeb and Emma have just come out to the back 'fore going to church."

In the glass his aunt and uncle were as clear as though they were but ten yards away. Emma walked with her rolling gait and wore her flowered frock and straw hat. Jeb wore his black and looked much as he always did. Then Jeb pointed to a corner and Emma looked and she backed away, startled. Mr. Dirim, looking sharper and browner, with his close-fitting suit and his little collection bag, approached the two. Jeb gesticulated. Emma put her hand to her mouth—and kept it there. Then, so clearly that it looked like some soundless stereo film, the two of them became smaller and smaller. And Billy laughed as Mr. Dirim picked up the two little figures and put them in the bag. Then he *went*.

He told Sam, who had been crouching by him as he watched the happy scene.

"Right," said Billy, "he's right every time."

He paused. "Reckon we ought to think about eating again."

Sam nodded; he felt beaten.

Night again, and the full moon over the countryside, silver and blue and mist, with the distant lights of Little

Corinth shining like pinholes through a shade.

They had lounged and they had eaten, and lounged again, and now, fully dressed, they lay on their beds, gazing from the uncurtained cave mouth out to where their visitor should come from.

They did not speak; all possible variations of conversation about Mr. Dirim and his (presumed) associates had been worked out as far as Billy was concerned; there were some things he did not wish to answer, it seemed. Sam got up and walked about the cave; he came back, found the remaining peach from the can, and ate it. Then he rubbed his hands on his jeans and looked at Billy, lying raptly gazing into the night. Doubt surged within him again.

"What's the time?" he asked.

Billy seemed to come back from somewhere. "Bout eleven," said Billy. "Why?"

"Why?" There was indignation in Sam's voice. "Why? Cause I want to know when he's coming. I want to see him."

Billy got up. When he spoke, it was with disgust almost amounting to hatred.

"Fool!" he hissed. "*I been*

sitting there talking to Mr. Dirim for the last quarter of an hour. One time, he stood by you. You ain't a believer!"

There was a rustling outside, a faint slithering. Rabbits. Sam paid it no heed.

"See, see!" jeered Billy. "He was here and you don't know. Said we had to take the journey. *I was chosen!*"

"Take the journey?"

Suddenly, the moonlight seemed to grow a little less; a firm voice spoke to them.

"You ain't taking any journey, son."

The boys leaped to their feet. The spare figure silhouetted was that of Ed Harrison junior; he carried a shot gun. Even as he spoke there was a scrabbling as two more men found safety on the ledge after descending the precipitous path by a rope. For a moment there was silence. Then Billy let out a shriek.

"Dirim!" he yelled. "Dirim, come help!"

Ed Harrison advanced and clapped a hand over his mouth. One of the men asked: "What the hell was that he said?"

No one answered him. The third seized the shaking, unresisting Sam, and he said: "We knowed you boys 'ud

be here. You got a few questions to answer, you."

"Me?" said Sam. "'Bout what?"

"'Bout, 'bout murder, maybe," said the third man.

"How'd you know we was here?" asked Billy.

"Got a 'phone call," answered Harrison. "Guy with a queer name—said he was a hunter or somethin'; name of—er—Darran, I think. Can't locate *him*, but we located *you*."

The car hummed on towards the depot. Billy and Sam were conversing in whispers. Companions in misfortune, their quick-sparking enmity and suspicion had vanished, and they were chiefly concerned with trying to think of fresh ways of convincing the police that they were telling the truth.

"But it *must* be a kind of plot," whispered Sam. He glanced round; the large cop in the back of the car where they were seated was dozing, and the one in front was talking to the driver.

"Sure, we told them everything."

"Ain't nothing we missed; ain't nothing we can do to make 'em believe us."

Billy asked again: "Why

we going to New York, mister?"

"Because," said the cop.

"But why——?"

It went just the same as before.

"Some folks there got a few questions to ask you."

"'Bout our folks getting took missing?"

The man in front turned round, and said: "You betcher!"

"But ain't there enough cops in Jellingsville to ask us all the questions? Why we got to go to New York? Sunday night they put us in the lock-up in Little Corinth, Monday they kept us there and asked us the same questions again, so why——?"

"BECAUSE!" rapped the cop.

The car drew up at the depot, and the two policemen took their charges in to wait. They were thorough; they never let them out of their sight. Hopes were dashed completely when they finally got seated in a car of the New York train. They were made to occupy the inside window seats, and there was not the slightest likelihood of their escaping unless, thought Billy, sharply, when they arrived at New York, the crowds might give them the chance . . . There was a click and a cold

feeling round his wrists, and there was another click from over at Sam's seat. The handcuffs were on. Sam's cop grinned at Billy's and said: "All right then, Joe?"

Joe, who was a large meaty convention-going type, grinned back, scowled ferociously at Billy, and said: "Now we can all relax."

"Ain't done a thing," growled Billy, conscious of the curious gaze of several passengers. "Told yer—ain't done a thing."

"We had all that," said Joe. "We had it a dozen times—you and your tales."

"Why do we have to go to New York?" asked Sam.

Joe looked over at his companion and said: "Because we got orders to report any sudden quick disappearances of any sort to the nearest big police headquarters. They got *machines* to ask you questions there."

"That's right," said Joe. "It's federal; they wanna know—and they'll find out. New York is a little nervous these days." He pointed across the aisle to where a man was reading a newspaper. Its flaring headlines said: "U.S., British, Soviet and Chinese Heads of State meet in N.Y. today. President's high hopes."

There was a smaller heading: "No crazy threats for two days; F.B.I. still seeking." "Maybe that has something to do with it."

Maybe it had, thought Billy, maybe it had. But he said: "Sam and me, we never hurt anybody."

"*They'll* know," said Joe, "won't they, Al?"

"Sure," said Al. "Now suppose we relax, huh?" He closed his eyes and Joe followed suit. Billy's eyes sought Sam's, and found there no hope, and then his gaze roved hungrily up and down the half-filled car. After a while, he closed his eyes. He did not know how long he slept; he did not know if he slept at all, for he had been talking again to Mr. Dirim, and he had reproached the little man, who, in his turn, had reproached Billy.

"But ain't we going to prove we are innocent?" Billy had asked his dream man.

"No, of course not!" The little fellow had hitched his bag on his back and said: "Why bother? You will join us soon . . ."

And then Billy had woken up.

He glanced dully across at where the man who had been reading the paper was

asleep, and then over to the newspaper being read by someone opposite.

A strange—a *very strange newspaper!*

The script was strange—the language was—foreign—the pictures . . . he found himself *reading it!*

"Today is the DAY!" cried the headlines. "TERRA WILL FIND OUT!" He leaned across, trembling, fearful of what he might learn, but knowing that he *must* learn. He strained at the handcuffs like a pup on a leash.

"The plain intimations of the Dirimi to the President of the United States," it went on "seem to have been ignored. Therefore, Dirim has decided that the laying waste of New York might be sufficient inducement for the United States and the rest of Terra to want to talk surrender. The long-awaited plan, which began nearly twelve years ago with the planting of the Jellingsville baby, is now materialising, for the Earthly shape of the young half-Dirim is now a zif bomb going to New York, where he will pass the centre of the city, where the Terran leaders are fortuitously gathered together, heedless of our

warnings, contemptuous of our might . . ."

The train stopped, the last time before New York. The reader got up and folded the paper and handed it to Billy. *It was Mr. Dirim!* Small and brown and neat. *His face, his face, his face!* But in a brown suit and a white shirt, a snap brim hat and bow tie. He smiled and said: "Like to look at the paper, sonny?"

Then he walked down the car and away with all the others.

Billy shrieked and stamped to his feet, while the passengers gazed in alarm.

"Get up, get up!" he howled at Joe. "That's the man, that's the man we told you about!" Fear and anger surged within him. He was a dupe, a stooge for these people. He was a loyal American!

He was dancing and waving and tugging.

"It was him, Sam, it was him, him, him!"

"Huh?" Joe found himself pulled to his feet. He was not very amused.

"That's the man! Look,

here's the paper he gave me! It's proof, *proof!*"

Dancing with excitement, he pulled Joe along the aisle and to the door before the bemused cop could fully realise what was going on. They stood and looked out on the depot.

"There he goes, there he goes!" squealed Billy, while in the seat Sam and Al strained to see.

Joe was suddenly angry.

"Reckon we need an alienist in this, too!" he snarled. "Here, gimme that!"

He grabbed the evidence, took one look at it, and roared with anger.

"All over some Yiddisher paper!" He jerked Billy's arm as he pounded the paper into a ball and threw it away.

As the train started, Billy allowed himself to be led back to his seat, trembling. He avoided Sam's gaze. He, who thought the Dirimi were his, was now theirs. The horror of it was beyond reason. New York next stop. Now he was quite sure that he would escape *there*. It seemed inevitable.

Book Reviews

FICTION

THE YEAR'S BEST SCIENCE FICTION NOVELS, Second Series, edited by Bleiler & Dikty, and published by Grayson & Grayson, 16 Maddox Street, London W.1, at 10s. 6d., is another of the well-known and justifiably recommended selections by editors who know good stories when they see them.

This particular selection comprises four novels, or rather, novelettes, and gives good value for the money. To decide which is the best of the four is an impossibility; all are equally good of their type. *The Enormous Room*, by H. L. Gold and Robert Krepps, tells the story of a group of people who hurtled down the big dipper and found themselves—elsewhere. Elsewhere was anything but snug, and the more they found out about it the less they liked it. How they managed to both survive and escape provides entertainment at its best.

In *Assignment to Aldebaran*,

by Kendall Foster Crossen, there was nothing to fear but plenty to outwit. The Aldebarans meant no harm; they just live by piracy and robbery and saw nothing to be gained by joining the Galactic League. Dr. Læertes Kwang Solomon had to persuade them to change their minds. Frank M. Robinson weaves a gripping story around rivalries in a spaceship years from home in *The Oceans are Wide*, while Murray Leinster, that skilful and invariably good author, works some distinctly odd magic by the use of some even odder fairy godmothers—they have tentacles instead of wands—in *The Sentimentalists*.

A fine selection, and one which should not be missed.

TIME AND AGAIN, by Clifford D. Simak, published by Messrs. William Heinemann, 99 Great Russell Street, London W.C.1, at 12s. 6d., may be familiar to inveterate magazine readers as *Time Quarry*, first published in serial form some five years

ago. The novel, rewritten for book publication, shows that a really good story can stand the test of time no matter whether it is science fiction or not. This book is science fiction at its best, well-written, smooth, intriguing and with real people and situations.

To relate the complex and involved plot would be to spoil the story for the new reader. It concerns Asher Sutton, who should be dead but isn't. It concerns the human-android war and a book which has not yet been written. Time travel is involved and conflicting interests and, at the same time, the author gives a realistic picture of what our future well may be. There is action, human interest, intellectual teasing and a mounting tension as conflict piles on conflict so that, literally, this is one of those few books which, once started, is almost impossible to put down until finished.

In short, it is science fiction at its best.

NON-FICTION

ENGINEERS' DREAMS, by Willy Ley, published by Phoenix House Ltd., 38 William

IV Street, Charing Cross, London, at 15s., is one of those books which, while having to be classified as non-fiction, reads more interestingly and is far more entertaining than many straight fiction books.

Here is a book to set your imagination working. The author discusses, with many photographs and illustrations, some of the projects which have been found to be practicable by engineers but which, for one reason or another, have not as yet been achieved. They range from the Channel Tunnel to a workable plan to reduce the level of the Mediterranean; from harnessing the energy of the tides, to drilling for heat; from solar energy to workable heat engines for use in the Arctic.

This is a book of vital interest to all, young and old alike, written in the smooth, easy style which has made the author so popular to the layman, and containing thirty explicit diagrams and maps and fourteen half-tone illustrations.

HYPNOSIS—ITS MEANING AND PRACTICE, by Eric Cuddon, published by Messrs. Bell & Sons Ltd.

York House, Portugal Street, London W.C.2, at 10s. 6d., is a book which does much to clear up the misunderstandings prevalent on the subject.

This book explains in clear, non-technical language the real nature of hypnotism and what can be accomplished by its aid. Full coverage is given to the basics of hypnotic practice; how to determine the most suitable subjects; the various methods by which hypnosis is induced, and a comprehensive system by which the hypnotist can determine whether or not the subject has been hypnotised, and how to end the condition when desired.

Of great interest are the explanations of varied phenomena which can be evoked during the hypnotic state; the limitations of suggestion; post-hypnotic suggestion and the use of hypnotism in medicine and surgery. This is a book which will appeal to all who are in any way attracted to a fascinating subject.

I LOOKED FOR ADAM, by Herbert Wendt, published by George Weidenfeld & Nicolson Ltd., 7 Cork Street, London W.1, at 30s., is stated as being the "story of

the men who searched for the origins of mankind." A statement which, while it tells you the purpose of the book, cannot even hint at how absorbing this book really is.

It has 556 pages, 40 half-tone illustrated plates, and a comprehensive index. In a way, it is a scientific detective story; the problem, to discover the truth about the origin of mankind; the detectives, some of the most remarkable minds of their time, philosophers, scientists, explorers and writers. Herbert Wendt tells of their lives and theories, their controversies and their discoveries, their inspired intuitions and their stubbornly-defended errors, and he does it for the layman, writing with scientific authority but without jargon.

The search for Adam began when most men believed literally in the biblical account of the creation, and when fossils were thought to be the relics of creatures drowned in the Flood. Later, the search was no longer for proof of the Flood, but for proof of the "Missing Link." Neanderthal Man, Heidelberg Man, Peking Man, Piltdown Man, one after another the famous finds became household words.

The pattern of the search is vast, and it goes on today. It will probably go on for a long, long time, but one thing is certain: there can be no more interesting search than that of investigating ourselves.

It is a search every intelligent person must be interested in, and this book, to them, will provide some of the most interesting reading they have ever known.

MAN AGAINST NATURE, edited by Charles Neider, published also by George Weidenfeld & Nicolson Ltd., at 21s., is a giant book of forty-five true, eye-witness stories by the world's greatest explorers, pioneers and adventurers.

This is another of those books which, while factually true, read better than most fiction. It is the accounts of how men and women faced and struggled with an environment which too many of us have forgotten. It is our own environment, unshielded, savage, ruthless as only nature can be. Our primitive ancestors fought it all the time, fought and won, and it is only when reading such accounts as these that the realisation of how far we are removed from our own world is brought home to us.

There is Louis Slotin's fight to the death with the effects of the nuclear radiation which he himself had released—a horrifying contemporary story. There is Cousteau's report on deep sea diving—in effect a report on a new world. There are the reports of Thor Heyerdahl and Albert Schweitzer, and men who have conquered mountains, fought wild animals, braved Arctic blizzards and killed whales.

And these stories are true.

Too often the incidents in science fiction stories are dismissed with a contemptuous reference to their being too fantastic to be real. I wish that such people would read this book. Then they would discover that the human body is capable of far greater exertion, courage, and dogged stubbornness than it is given credit for. As a record of factual accomplishments it is beaten only by its entertainment value.

THERE IS LIFE ON MARS, by The Earl Nelson, F.R.A.S., F.R.G.S., F.R.S.A., published by T. Werner Laurie Ltd., 1 Doughty Street, London W.C.1, at 12s. 6d., is a book which has brought the latest information science has discovered about the red planet

to bear on the old question "Is there life on Mars?" The author believes that there is, and sets out to prove it.

The proof resolves itself on a study of the varying sizes of the "vegetation" patches, the canals, the probable water-content of the extremely thin air, and conclusions drawn from photographs taken in different lights, coupled with the known capabilities of certain bacteria here on Earth. The conclusion the author has drawn is that there is certainly plant life on Mars, and possibly intelligent life also, though he states that such intelligent life may be entirely unfamiliar to us. No science fiction reader will dispute the possibility of life existing beneath utterly different conditions to our own.

The book, unfortunately, does not confine itself to one planet, but makes an attempt to speculate on the possibility of life on Venus, the probable future of space flight, and the establishment of a Luna base. I say "unfortunately," because the subject matter of the title deserves more space than that given it, but despite that, this is a book which all who are interested in "scientific speculation" will thoroughly enjoy.

CONSTRUCTING AN ASTRONOMICAL TELESCOPE, by G. Matthewson, published by Blackie & Son, Ltd., 17 Stanhope Street, Glasgow, C.4, at 7s. 6d., is the most comprehensive and easy to follow book I have ever read on this subject.

Even if you have no inclination to make your own telescope, this book is well worth obtaining for the information it contains. Graphically written, well-illustrated with line and half-tone on art paper, it explains every step of telescope production from the very beginning to the finished, mounted product.

SCIENCE AND MODERN LIFE, by Sir E. John Russell, published by The Epworth Press, 25-35 City Road, E.C.1, at 6s. 6d., is the Beckly Lecture for 1955.

It deals with some of the problems arising out of the rapid advance of science and technology, isolates their causes and effects, deals with the newer problems arising from the unexpected effects of scientific progress, and attempts to propose a solution which, while workable, may not be the best, but is certainly the best yet offered. A mature and thoughtful book.

Discussions

KICKS!

Your editorial in No. 64 really cannot be allowed to pass without some comment. How can you have the brazen effrontery to think *Authentic* good? Let's cast a calm, dispassionate eye over the past year.

The magazine is called *Authentic Science Fiction*. Over 1955 you've gradually changed that title to *Authentic Science* (and some fiction). Now, if I want science articles I buy a magazine specialising in them, where the illos and cuts are more than a ghastly smear. And if I want science fiction I buy a magazine specialising in that. You have now dropped neatly into a limbo halfway between the two. By all means have a few articles—interesting ones dealing with space travel and so on—and without the awful illos. If you insist on using photographs please print them on art paper, not pulp.

What of the fiction? Well, two comments . . . The standard isn't high enough and there isn't enough of it. So how about a change in policy? More, better fiction; fewer, more apposite articles. And, while I'm on the subject, why not an adult question and answer department?

W. M. Beaulie, 2 Redesdale Street, London, S.W.3.

You've got it, it is here, this is it, the question and answer department, I mean. While it is not possible for me to answer each question privately,

yet, if they are of general interest, they can be dealt with in the readers' section. The rest of your criticism may, to you, no longer be a cause of complaint. Will you let me know?

THE RED SHIFT

I've been reading *Authentic* for a long time now and I like it very much. I like the articles, too, as I am deeply interested in science. There is a question which has been bothering me, and I wonder if you could answer it? It is about the Red Shift. What is it? What does it do? And what does it mean? I think it has something to do with the expanding universe, but I'm not sure what. I don't know whether you do answer questions but, if you do, I would be grateful if you would explain this to me.

Leigh Wright, 26 Westwood Road, Southampton.

The Red Shift is the name given to a phenomenon which could quite possibly explain the observed data which has given rise to the theory of the expanding universe. As you know, light observed from distant nebulae has shown a distinct shift towards the red end of the spectrum. Now, this shift can be explained in either one of two ways. The upholders of the theory of an expanding universe say that the shift towards the red is caused by the Doppler effect which shows that the source of that light is receding from us at incredible velocities. Perhaps you would grasp the concept a little better if I were to

draw an analogy with something familiar, such as an express train. Assume that you are standing on a platform, and that an express train is passing through the station. The whistle is blowing, and as the train comes towards you, the note of the whistle seems to rise higher in pitch. After it has passed you, the note seems to lower in pitch. Actually, of course, the note does not alter its pitch at all; the apparent difference is caused by the Doppler effect.

To clarify a little more—the Doppler Principle rests on the fact that, to an observer approaching the source of any wave motion, the frequency appears greater than to an observer moving away. Thus, light emitted by a receding body would appear more red—red light being of a lower frequency than other colours—than it would if the body were at rest, or, alternatively, coming towards the observer.

Now, all light received from the distant nebulae shows a shift towards the red, and this has been attributed to the possibility of those nebulae receding away from us—thus the theory of the expanding universe. However, there is another, newer theory, which, while explaining the “Red Shift”, does so without the assumption that every star and galaxy is running away from every other star and galaxy.

This theory, which is the one usually meant by the Red Shift, is that light could, possibly, get ‘tired,’ and that after travelling for centuries some of its energy is lost with a resultant lowering of frequency, and the observed shift towards the red. This would account for the fact that the more distant sources of light show a greater shift towards the red—which is explained by the

older theory as proof that the more distant sources of light are receding away from us faster than the nearer sources.

Which theory is correct no one knows. Either you accept that we are in the middle of what is, in effect, a tremendous explosion with every scrap of matter in the entire universe running away from each other from a common centre, or you take the view that light, a form of energy, could quite possibly lose some of that energy during the time between emission and reception.

MORE KICKS!

Glancing through some back issues of the magazine, I was surprised to find that articles outnumbered stories. Now I am not decrying the articles, but the magazine is called *Authentic Science Fiction*. Nor am I suggesting that you drop the articles altogether, but they could be cut down. If readers want to know more about certain branches of science, perhaps you could run an information bureau recommending journals and books, rather than print articles of which only a small proportion would interest the majority of readers.

I have no complaint about the book reviews. Science fiction books have a better chance of being reasonably appraised if reviewed by an expert, and the same applies to the non-fiction books, some of which are of interest to the readers, especially those dealing with science and space flight.

Now for the fiction. For some time past it has been like the curate's egg—some of it good. Furthermore, it seems to me that a certain kind of unreality has been creeping in. Now I know that the genre gives greater scope for

imaginative writing than any other form of literature and I think it could be described briefly as "improbable but possible." It seems paradoxical, but the better the "suspension of belief," the more believable the story. Two recent stories will illustrate what I mean. One story concerned a female android who owned a large, chauffeur-driven car; the other with the premise that only one sex could go into space because the radiations would cause permanent genetic damage to the other. This seems to be utter nonsense! The two sexes are chemically the same, and if radiation will destroy one, then it will destroy the other.

By citing these two stories I've tried to explain what I mean by unreality. They were not logical in that they did not adhere to known patterns. Androids would not be permitted to acquire wealth and the power that wealth bestows, and if I know my own sex, if women couldn't take men into space with them, then they wouldn't go at all.

Keep Dusty Dribble by all means. There is plenty of room for humour in science fiction, and how about more stories dealing with sociological problems future technology will bring? What will happen when men have to compete with robots? Or we have to export to the planets or starve? Or . . . Well, you tell us.

Roberta Wild, Slough.

We will, or rather the authors will for, as you say, science fiction offers the biggest scope for any writer to crystallise his ideas as to what the future will bring. But, as no one knows for certain what that is, it is unfair to force the stories into a nice, neat, recognisable package. Why

should it be so illogical for androids to possess power and money? How do we know that both sexes can live in space? We don't know the answer to these questions yet; perhaps we shall never know, but in the meantime we can speculate. Reasonable extrapolation is not illogical guesswork which, from your letter, is what you, like others, rightly decry.

PRAISE!

I like *Authentic*. I like the articles and I like the stories, most of them, anyway, and I like the warm, friendly atmosphere about the magazine. That isn't to say that it couldn't be improved. It could. You could illustrate the stories and get some better paper to print your photographs on. Why can't we have the art paper supplement back again? And what's wrong with "Projectiles" lately? Hardly an interesting letter from one issue to another.

Aside from all that, I still think that the magazine is the best buy on the stands today. I'm tired of paying out money for a large chunk of serial, a so-called novel, and a couple of short stories. As no one can like everything at the same time it means that quite a large portion of the mag is a dead loss to the average reader—not the same portion, of course, but the percentage is about the same. With *Authentic* you do get a selection of shorts, of which most are really satisfying. A science fiction story, to me, is a short story. I can't see how you can suspend belief for the length of time a novel takes. Unless the author is a skilled writer he will make slips and try to explain too much, with the result that the story becomes more of a fairy tale than mature writing.

Let us have plenty of short stories and you can be certain of at least one loyal reader.

J. Palfrey, 31 St. Joseph's Road,
London, N.18.

Thank you, but isn't it a little unfair to complain about the readers' department? To do that is to blame yourself, for unless the readers write the letters, how can they be printed?

ASSESSMENT

I read the articles on "Desirable Residence, 1995" with some interest because, as a housewife myself, I am interested in anything science can do to lighten the burden of running a home. But it wouldn't be necessary to wait that long for the kind of house described in the article. Everything mentioned is available today—or was that the point of the article?

As a woman, I would like to see more stories told from the feminine viewpoint. All the heroes are seemingly without wives, mothers, sisters or girl-friends, and the little problems, the ones that are so important to women, are completely ignored. I know that it is interesting to read of a space pilot repairing his atomic pile, but it would be nice, for a change, to read of a young mother trying to wash her baby's nappies while in free fall. The problem, to her, would be just as important and as essential of

solution. Still, we women are very conservative, and I suppose that is why science fiction attracts so few of us.

Mrs. Michael Smith, The Yard,
Lyndhurst, Hants.

There is always a time-lag between new discoveries and their general acceptance or availability. While, as the author knew, most of the appliances mentioned in the article are in production, yet the houses to contain them are not. Even today, long after radiant heaters and electric fires have been available, houses are still warmed by burning coal in open grates. To make full use of scientific progress as applied to the home, the home should be designed to contain them.

SWAPS

Noticed an advertisement in the letter column of a recent issue in which you said that you'd publish any letter which dealt with mag-swapping.

Well, I run a trading bureau and will swap mags with anyone who cares to drop me a line. Rules are simple. Just drop me a letter stating what you have for swapping and the type of stuff you read or want in exchange.

Gavin Brown, 47 Causeyside Street,
Paisley, Renfrewshire, Scotland.

Anyone interested?

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I am doing what I, and everyone who knows me, said I would never do, give up smoking. I have not had a cigarette since the first day it arrived.

M.S., Chingford.

Dear Sirs,

I am writing to say thank you for your APAL. It has worked wonders. After smoking 40 cigarettes a day, I have stopped smoking.

H.M., Dumfriesshire, Scotland

Dear Sirs,

It is a year ago last November that I stopped smoking, with the aid of APAL: no cigarette has touched my lips since the day I received the APAL. I sleep better and have not had a cold since, and I am saving 24/6 every week.

G.A.S., Osselt, Yorks.

Dear Sirs,

I am very pleased with my APAL. I have been much better in health since using it. It certainly takes away the longing for a smoke. Thanking you very much.

Mrs. C.A.H., Coventry

Dear Sirs,

Fifty cigarettes a day for over twenty years is pretty good going and nobody would have me believe that I could ever give it up. Your APAL arrived four and a half weeks ago and I am delighted to say that I have not smoked since.

F.F., Hertford.

Dear Sirs,

I bought an APAL from you nearly eighteen months ago, and it did for me all that you said it would. I have not smoked for seventeen months, and have no desire at all to do so.

G.H., Marham, Norfolk

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